FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

A Question of Responsibility.

We had hoped that the Secretary of State for War would have made some sort of statement with regard to recent accidents in the R.F.C., and particularly that one by which Capt. Allen and Lieut. Burroughs were killed, in time for us to have dealt with the official explanations regarding the responsibility for the condition of B.E. 204 at the time of the occurrence. At the time of writing, however, nothing whatever has transpired, save that it is intended to appoint a Court of Enquiry to deal with the matter. We must say that this is very far from satisfactory, in the light of the evidence given at the inquest, and more particularly with reference to the evidence and statement of Major Brooke-Popham. The facts as disclosed are that the accident was caused through the breaking of the rudder-bar. As to what caused the fracture, an official of the Royal Aircraft Factory said he found on examination that the rudder-bar had been filed at the spot where it was welded to the rudder, thus reducing its strength to a dangerous extent. It is thus quite clear that the initial cause of the deplorable occurrence which lost two gallant officers to the Service was neglect on the part of someone amounting to great culpability, even verging on criminality. That is the very lightest term that can be applied to it. Major Brooke-Popham went even farther, when he said:—"There are three possible causes for the accident: First, the design of the machine may have been wrong, and the strains miscalculated. Second, the workman who did the job may, through ignorance or carelessness, have put in too weak a tube. Third, the rudder post may have been changed after reconstruction, and after it was handed over to the squadron. In any of these three cases there is evidence of criminal negligence. If it were done in my squadron, I am to blame. On the contrary, if the machine was handed over to me like this, and nothing was done in my squadron, I hold the officials of the Royal Aircraft Factory responsible."

At the present moment we are not concerned with the precise degree of culpability, or criminality, of the person to whose carelessness the accident was primarily due. That is a matter which might well be left over for future discussion, if and when the culprit is discovered. The astounding thing, however, is that it does not appear possible to trace the individual responsible! Whether the Court of Enquiry will succeed in eliciting the information we have no means of knowing in advance, though we are not at all hopeful in the recollection that when last year, Lieut. Arthur was killed at Montrose through a faulty repair to a wing-spar, it was found impossible to trace the responsibility down to its first incidence. In the present case, the coroner in summing up delivered himself of the significant remark that it was extremely doubtful if the person who filed the bar would ever be discovered!

Here is a deplorable, indeed a damnable state of things. A machine to which gallant officers have to trust their lives in the everyday course of their duty is repaired in a careless, incompetent manner which directly results in two of those officers losing their lives, and we have to be content with the hopelessly inept information that "it is impossible to discover the person who is guilty of—we had almost written murder. Can any more fatuous, more incompetent, more callously lame "explanation" be imagined? Is there no organisation in the Royal Aircraft Factory or in the R.F.C., no system of tracing what is done and by whom? It looks like it—very much like it. If we are right in our conclusion, and we see no way to any other, then the sooner our flying service is provided with a really competent

works manager, conversant with the simple everyday system of a large factory the better. In every motor works in the country there is a system of checking and inspection which enables the responsibility for even the minutest part of the day's work to be traced right down. Surely if that is found necessary in motor car construction—and in every other scheme of manufacture, for that matter—surely it is doubly necessary in the case of aeroplanes upon which people have to risk their lives and in which the least fault may lead straight to tragedy. It would not be fair to pass final judgment until the Court of Enquiry has probed the matter to the bottom, but on the face of the thing as we see it now, somebody should be hanged higher than Haman, even if that somebody is the Secretary for War himself.

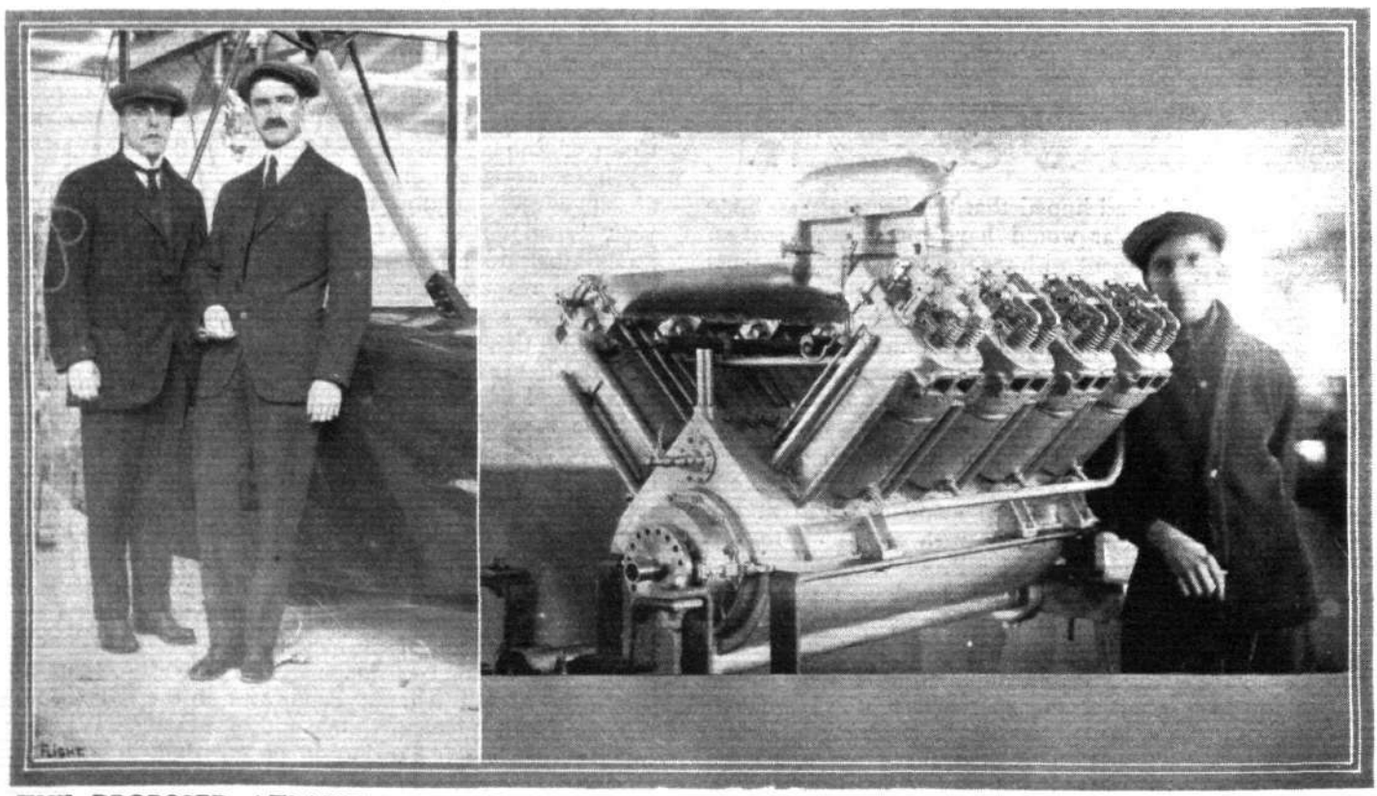
Mr. Churchill on Naval Aviation.

In another part of this issue of FLIGHT we publish, almost verbatim, that part of the speech made by Mr. Winston Churchill on the introduction of the Naval Estimates which deals with the air service. There is thus no need for us to refer in detail to the First Lord's statement, more than to say that he is budgetting for an expenditure of £900,000 on the Naval Wing of the air service during the coming financial year. That is in addition to the money to be voted for the Military Wing, as indicated by Col. Seely when speaking on the Army Estimates. That is perfectly satisfactory, and should provide ample margin for the proper development of the service in comparison with that of "the next strongest Power," which was so much in evidence in Mr. Churchill's speech. We may therefore breathe rather more easily than we were able to do a year ago, when it seemed exceedingly doubtful if the necessities were really grasped by the titular heads of the fighting services and their expert advisers. Not only can we express satisfaction at the financial provision to be made for the Naval Wing, but we may congratulate ourselves on the position we hold even now so far as the sea service is concerned. To use the words of the First Lord, "we are without doubt in numbers, in quality, and in experience, far in front of any other country in seaplane work."

There is only this one note, not of criticism but of comment, to be made, and that is that we look to Mr. Churchill and his advisers to see that now that the hand has been seriously put to the plough there shall be no slacking off in the efforts to place this country in a state of the same absolute supremacy in the air that we enjoy on the seas. We cannot afford to see ourselves overspent and overtaken in material equipment by any possible rival. Aircraft are relatively cheap to build, and we have no manner of doubt that as soon as the details of our programme have been grasped by others, desperate attempts will be made to nullify the advantage we are assured by the First Lord that we possess at the moment. That these attempts shall not succeed we leave with all confidence to Mr. Churchill.

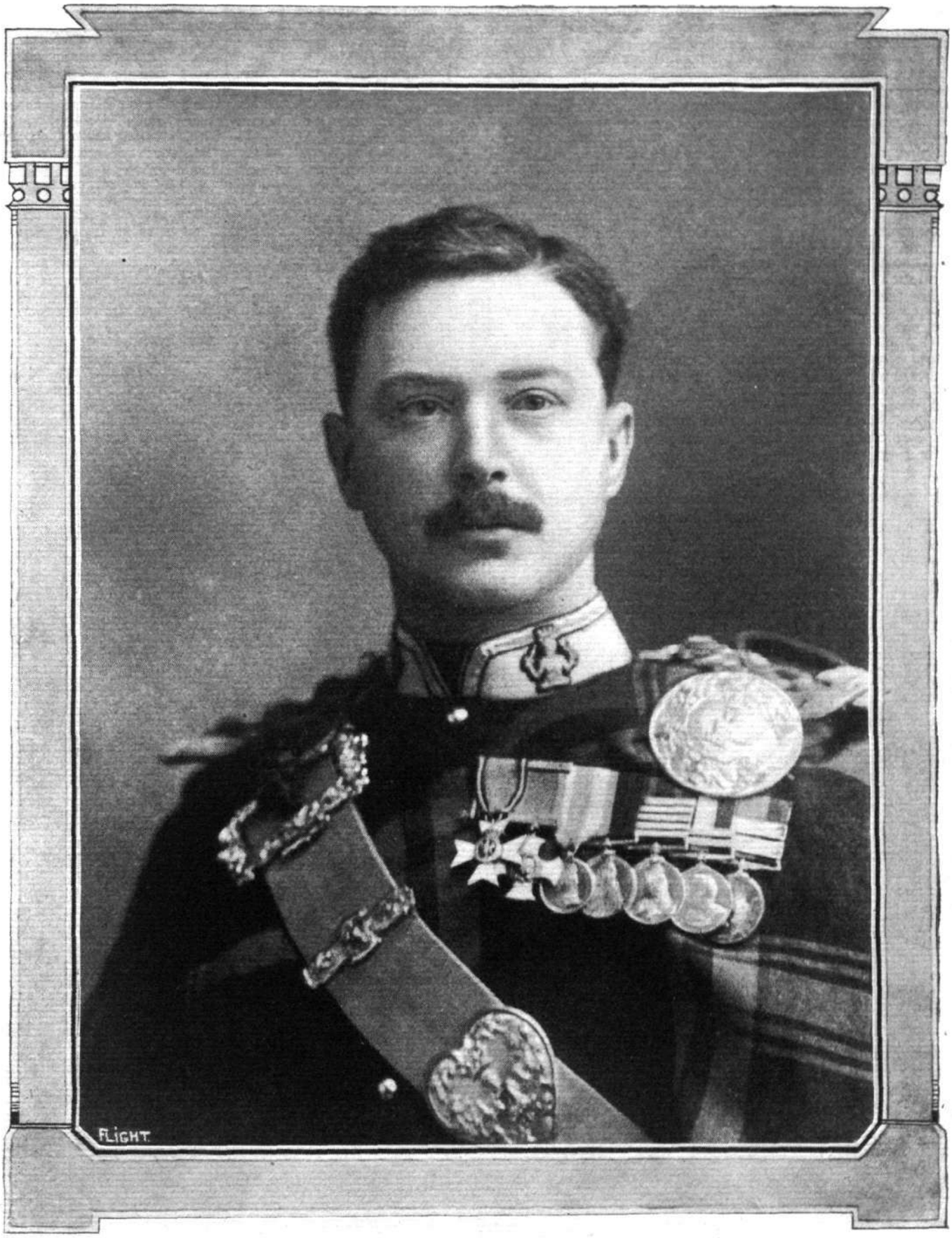
To Those Whom it may Concern.

IN thanking many correspondents who have kindly pointed out that a picture of an aeroplane, other than a Martinsyde, appeared in the Martinsyde advertisement last week in FLIGHT, we would say that the advertisement appeared in accordance with instructions and copy received. As, however, the advertisement department of FLIGHT is run by the advertisement department and not by the Editor (which possibly with some papers is not the usual custom), the fact that an advertisement clerk, in the rush of exhibition work, did not detect the slip of the advertiser, is not, we think, very surprising. However, we understand that Messrs. Martin and Handasyde are, as a result of this incident, well satisfied with the proof that they have received of the close attention given by readers to advertisements appearing in FLIGHT—which is gratifying all round. *Verb. sap.*



THE PROPOSED ATLANTIC FLIGHT.—The pilot, Lieut. J. C. Porte, the constructor of the American flying boat, Mr. Glenn H. Curtiss, and the 200 h.p. 8-cylinder Curtiss engine which is to be installed in the machine—a combination with which it is hoped to cross the Atlantic this year.

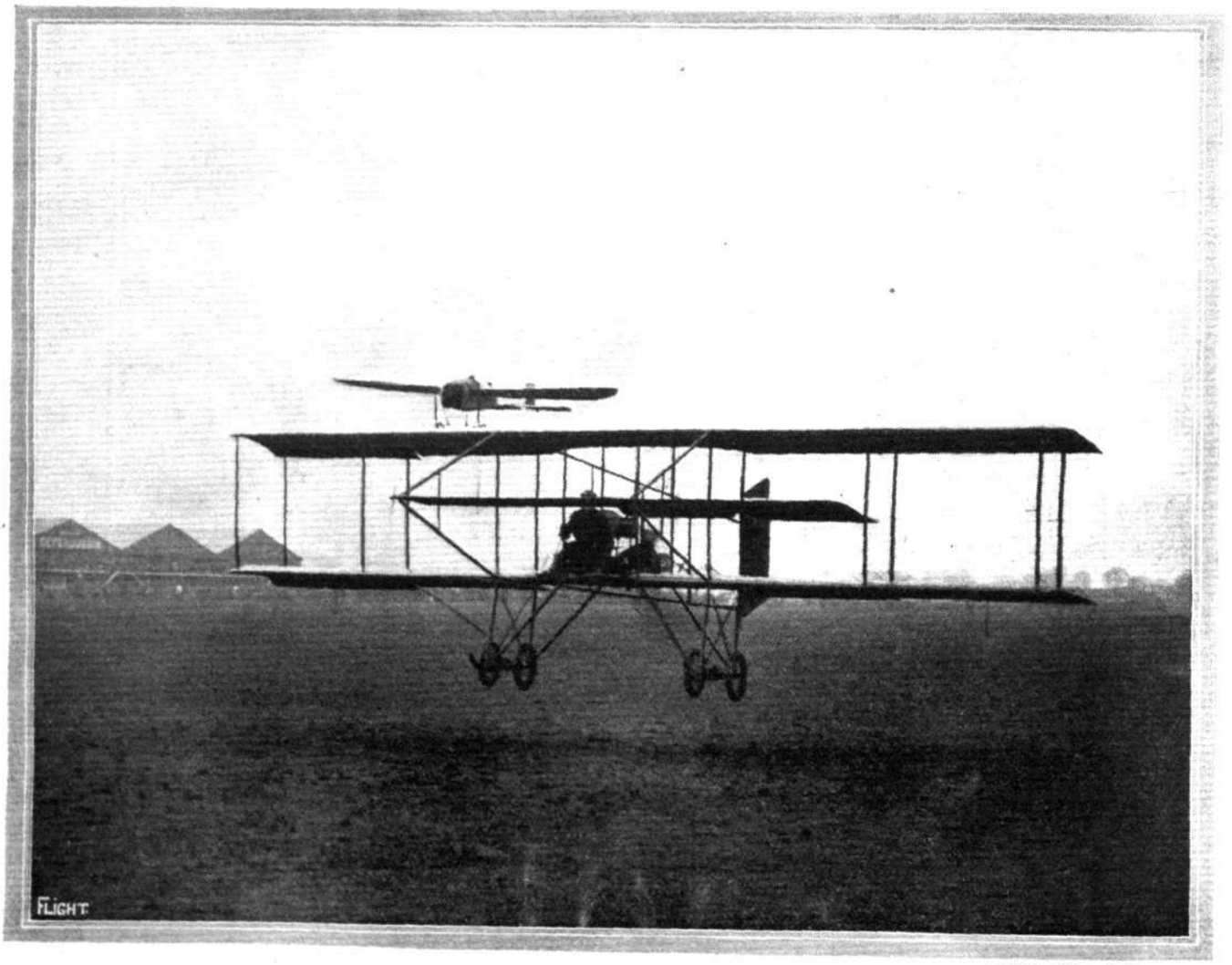
MEN OF MOMENT IN THE WORLD OF FLIGHT



CHAIRMAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.
THE MARQUESS OF TULLIBARDINE, M.V.O., D.S.O., M.P.

FLYING AT HENDON.

As Alice said, "Curiouser and curiouser!" What the next flying wonder at Hendon is going to be is hard to tell, for when it comes to two pilots looping the loop almost within a biscuit's throw of one another only a matter of several hundred feet from the ground, it requires a rather powerful stretch of the imagination to predict future aerial "stunts." Apart from the wonderful nature of the combined looping display given by Gustav Hamel and B. C. Hucks at Hendon on Thursday afternoon of last week, it was, perhaps, the prettiest aerial "turn" we have seen. Prior to the looping some exhibition flights were made by R. H. Carr on the G.-W. tractor biplane "Lizzie," Philippe Marty on the 80 h.p. Blériot, Louis Noel on the 70 h.p. Maurice Farman, and W. Birchenough on the 50 h.p. G.-W. 'bus. At 3.45 p.m., Hucks ascended on the looping Blériot, and making a half circuit of the aerodrome rose to a height of 800 ft., where he made a short upside-down flight. He then ascended to 1,500 ft. and made three successive loops to about 600 ft., then climbing again, drifting the meanwhile over Elstree, he reached an altitude of 2,000 ft. At this height, when once again over the aerodrome, he made nine loops one after the other, falling about 1,000 ft. in doing so. After climbing once again he executed six successive loops, making in all 18 loops in the 17 minutes he was up. In the meanwhile Hamel had ascended on his 80 h.p. Morane-Saulnier "Black Maria." Rising with a series of sharp turns to a height of 900 ft., he made one loop followed by a series of dives. He then made another loop and a side loop, after which he made two loops in succession. After this came a tail dive, recovering so rapidly that one was unable to observe exactly how he regained his normal position. Before landing he made a series of sharply-banked turns. On several occasions both pilots came very close together when looping. Some more exhibition and passenger flights were then put up, most of the pilots getting quite "loopy," for Marty on the Blériot, Carr on "Lizzie," and F. W. Goodden on the 45 h.p. Caudron, all but made loops. The behaviour of the little G.-W. tractor was most remarkable, for Carr made it pirouette for all the world like Nijinsky. Flights were also made by J. M. Cripps on the G.-W. 'bus, Louis Noel on the Maurice Farman, and by Hucks with a passenger on his Blériot. Shortly before 5 o'clock Hucks went up on his looping Blériot, Hamel following immediately after on his Morane-Saulnier, and liberating a number of paper gliders, which looped to earth. Having attained a height of about 800 ft., Hamel and Hucks flew abreast of each other for a short distance, separated, and then drew together again, and when abreast once more simultaneously looped, certainly not more than 50 yards apart. Hamel made another loop immediately after, then Hucks, and then one more from Hamel, followed by a side loop. All these evolutions were made with great rapidity and with the two machines very close together, and against the fleece-like clouds with patches of blue sky behind them, it was indeed an inspiring sight. The two pilots then made their way towards the centre of the aerodrome once more, still keeping fairly close together—Hamel's machine being faster than Hucks', the former made a detour now and again—and when there, Hucks made a double loop and Hamel a single one. They then separated, executing numerous side turns and dives, and then made one loop each at opposite ends of the aerodrome. Hamel next made two side loops, Hucks making a double loop immediately after. When at the top of his second loop, Hucks flew upside-down for five or six seconds, but being head to wind the machine remained motionless for that time, so that it looked as if it was pausing at the top of the loop. Hucks then proceeded to fly up and down in front of



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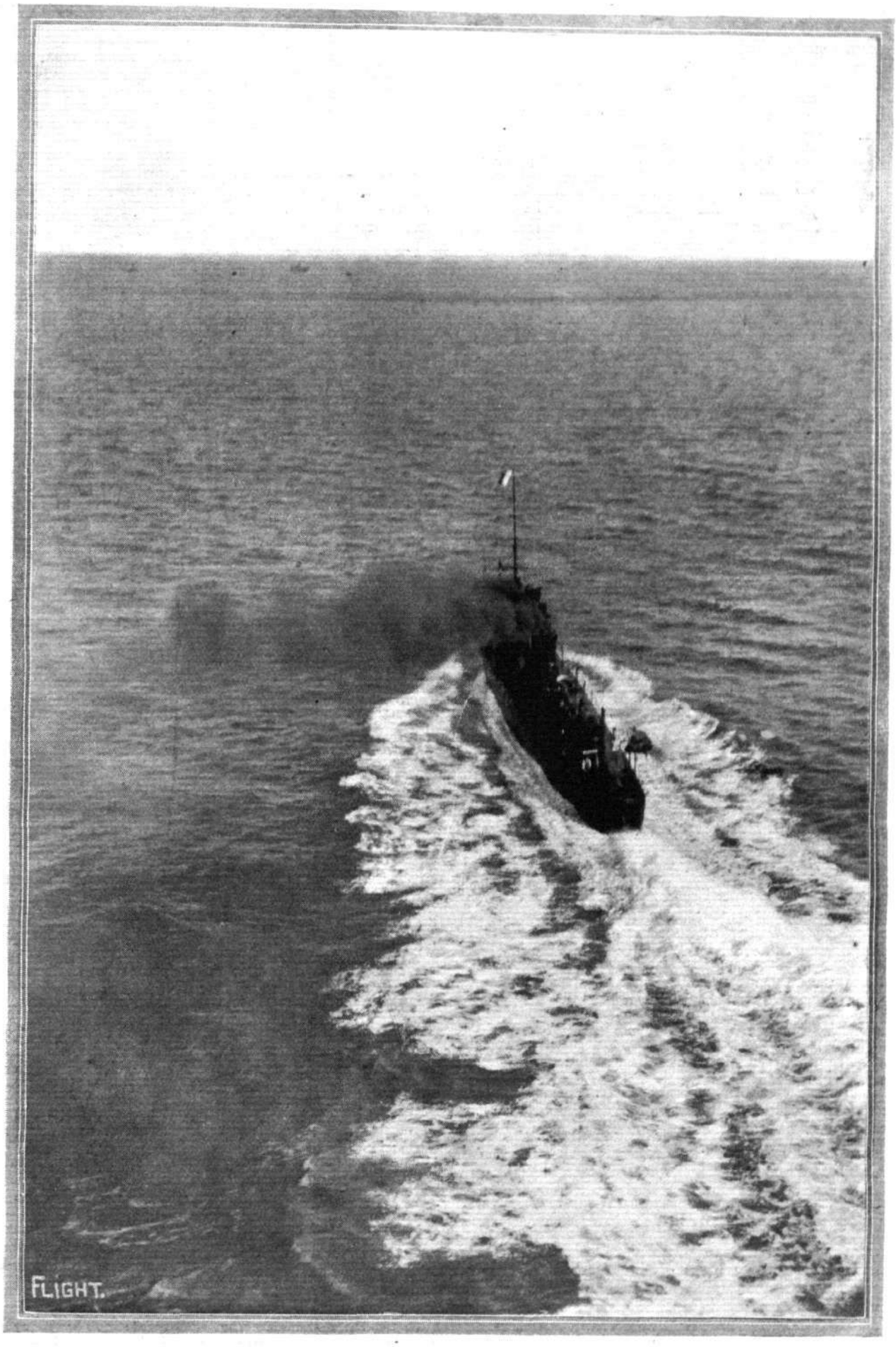
L. Noel on the Blériot overtaking Strange on the G.-W. 'bus during the race on Saturday last at Hendon Aerodrome.



One of His Majesty's destroyers on trial, as seen from above, being a snap by Mr. W. J. Casey when flying in Lieut. Sedden's Maurice Farman last September.

the enclosures some ten or fifteen feet from the ground before landing. Hamel's next move was to head to wind and throttle down his engine, so that the monoplane began to "pancake." After repeating this manœuvre, he made a final loop and then landed. A few passenger flights by Louis Noel on the Maurice Farman brought the proceedings to a close.

The combined looping demonstrations were to have been repeated on Saturday afternoon last, and drew a large number of visitors to the aerodrome, but the elements decided otherwise, for although it was fairly fine, but windy, the rain "came down" at 3.30 p.m., and never ceased. The only flying, therefore, were two fine high flights by Lieut. Spencer Grey on the 90 h.p. Sopwith, another Russian Ballet by R. H. Carr and "Lizzie," and a passenger flight by Louis Noel on the Maurice Farman. Although the weather on Sunday afternoon was dull, rainy and gusty, and only a few spectators turned up, a series of thrilling flights were given by Gustav Hamel on his 80 h.p. Morane-Saulnier. He first went up at 3.30 p.m., and in a flight lasting ten minutes he executed four complete loops, four side loops, and two tail slides, at a height of from 600 to 800 ft. At 5 o'clock he made another short flight lasting about two minutes, during which he made a rapid side loop and one complete loop. Later on he went up again for ten minutes, and at a height of 800 ft. he executed four more complete loops and two side loops. In all, therefore, he made sixteen complete and side loops. The only other flights were two by Louis Noel, with lady passengers on the Maurice Farman.

NAVY ESTIMATES.

IT is impossible to give a complete summary of all the expenditure in the Naval Estimates for which naval aeronautics are responsible, but in his speech introducing the Estimates in the House of Commons, Mr. Winston Churchill stated that the total amount was £900,000. Below we give the principal items as they appear in the Estimates, with, where possible, the corresponding amounts included in the previous year's Estimates :—

Aircraft, building and repairing by contract—	1914-15.	1913-14.
	£	£
For airships, aeroplanes and seaplanes—		
Already ordered { Hulls, machinery and fittings	135,000	
Already ordered { Gun mountings	2,500	
To be ordered { Hulls, machinery and fittings	165,000	
To be ordered { Gun mountings	—	
For repairs and alterations, and for replacements of parts of hull, machinery and gun mountings of airships, aeroplanes and seaplanes and for aircraft experimental machinery	72,500	113,300
Total	375,000	113,300
New ship for carrying seaplanes	80,000	—
Salisbury Plain Aviation School	18,950	21,000*
Contribution to War Department towards cost of Central Flying School	20,000	25,000
Accommodation for airships generally ...	94,440	72,000†
,, ,, seaplanes ,, ...	51,560	22,000‡
,, ,, aeroplanes ,, ...	3,350	9,000§
,, ,, seaplanes (Sheerness) ..	12,650	6,600‖
Air Department salaries, &c.	5,371	2,371
Naval officers and men serving or under training in the Royal Flying Corps (remuneration additional to Naval Pay)	34,500	8,000
Marine officers and men (remuneration additional to Marine Pay while serving or under training in the Royal Flying Corps) ...	8,335	2,000

The following is the abstract from the first Lord's memorandum, relating to aircraft :—

During the past 12 months a considerable advance has been made in the Naval Air Service.

Seaplanes have combined for war exercises with the Patrol and Defence Flotillas, and also took part in the naval manœuvres in July, and a flight of naval aeroplanes was employed during army manœuvres. Considerable success attended the operations of the aircraft in all these exercises.

A cruiser was specially commissioned and fitted out to carry seaplanes during the summer of last year, and a large number of flights were made from her. In consequence of the experience gained in this ship it has been decided to procure a special vessel as seaplane carrying ship.

Progress has been made in the establishment of a chain of seaplane bases round the coast; five such stations have already been completed, and the formation of others is proceeding. Good progress has been made with the design of the seaplane itself, and its development into certain standard types for war purposes is proceeding rapidly.

The practical utility of aeroplanes and seaplanes for war purposes is increasingly evident and the experiments in connection with bomb dropping, wireless telegraphy, and gunnery have been continuous.

At certain of the bases round the coast the *personnel* of the Air Service have replaced the Coast Guard, and are carrying out Coast Guard duties in addition to Naval Air Station work. As the Air Service develops it is hoped that a considerable number of the Coast Guard stations may be transferred and economies thereby effected.

Good progress has also been made in the development of airships. The Astra Torres and Parseval airships ordered last year have been successful, and further orders for ships of this type have been placed.

Two of the leading shipbuilding firms, Messrs. Vickers' and Armstrong's, have undertaken the construction of airships in this country, and have been given orders for four and three airships respectively.

The establishment of an airship station on the Medway with two sheds of the largest size is being pressed forward, and should be completed shortly. A site for another station in a suitable position has been procured, and the establishment of an inland airship station for training purposes is under consideration.

After full discussion with the War Office it has been decided to amalgamate the naval and military airship sections and to place the control of this branch of the Air Service wholly under the Admiralty. Arrangements have therefore been made to transfer the army airships to the Admiralty, and in future all airship work will be carried out by the navy. Several officers of the army airship section with their men have agreed to transfer to the Naval Wing for the development of the Airship Service. Their experience in aeronautical work is valuable, and their services will be welcomed by the navy.

Training in aeroplane work has been continued at the Central Flying School and the Naval Flying School at Eastchurch; and in airship work at Farnborough. The headquarters of the airship section will be transferred from Farnborough to the Medway as soon as the new station is completed.

At the Central Flying School four complete courses for naval and military officers have been held since its opening, and a fifth is now in progress. About 30 naval and military officers have been trained in each course, and a number of men of both services have also been trained in air work. In addition, a number of officers have been through short courses at the School. At the Naval Flying School at Eastchurch a large amount of training work has been carried out, particularly in the training of engine-room artificers, artisans, and other ratings in flying and in the general care and maintenance of aeroplanes of all kinds and their engines.

Arrangements for the special entry of civilians as officers and mechanics have been made, and the regulations are about to be isssued.

During the year, there were three fatal accidents in the Naval Wing, one death being caused by a propeller striking an officer when on the ground, one officer being killed while flying as a passenger with a civilian aviator, and a third officer being killed while flying on duty.

Coastguard.—Calshot Castle, Warsash, Isle of Grain, and Great Yarmouth Coastguard Stations have been transferred to the Air Department, and the necessary arrangements made for the duties hitherto performed at these stations by the Coastguard to be carried out by the *personnel* of the Naval Air Service.

In his speech introducing the Navy Estimates in the House of Commons on Tuesday, the First Lord of the Admiralty, Mr. Winston Churchill, said :—Now I come to air. We have now 103 aeroplanes, of which 62 are seaplanes. We have 120 regular pilots and 20 officers who have taken their Aero Club certificates in addition. Five seaplane stations have been established along the coast. Two others are under construction. The *personnel* of the new service has had to be created, and there are now 125 officers and 500 men in the Air Service, and by the end of the year the numbers will reach 180 officers and 1,400 or 1,500 men. This new Service is thoroughly naval in spirit and character, but at the same time it contains, and must contain, a large element of civilians, both officers and mechanics. This is indispensable to the proper development. We cannot spare an unlimited number of naval officers and naval ratings. The seaplane has a great future before

* Probable expenditure to March 31st, 1914, £24,250.
† ,, ,, ,, £94,000.
‡ ,, ,, ,, £16,000.
§ ,, ,, ,, £19,000.
‖ ,, ,, ,, £14,150.

it. We cannot doubt that it will play an effective part in military and naval arrangements. We are without doubt in numbers, quality, and experience, far in front of any other country in our seaplane work. Money will be required for the development of this Service in the next few years, and the results will be ultimately remunerative in other directions. Various functions will be discharged by the seaplanes and aeroplanes of the Naval Service. The first function is scouting at sea either from the land or from a seaplane-ship—that is a special ship which will take a number of seaplanes out with the Fleet, and will enable them to reconnoitre from a moving base. In the second place, they will be extremely useful for watching the coast. We rely for our security on our East coast against raids very largely upon patrol flotillas which are grouped at strategic points, and can be summoned and directed to any point where an attempted landing is being made. No assistance can be more valuable than the assistance rendered by aeroplanes and seaplanes in bringing information in regard to which time is vital to the bases where the patrol flotillas are held in readiness. Of course, the heavy seaplanes which we are developing now will carry formidable explosives, which can be dropped on transports and disturb a landing, even before the patrol flotilla can arrive. The seaplanes fly by night as well as by day in ordinary weather. They carry wireless telegraphy which enables them to signal 120 miles effectively, and quite recently they have been able to receive a message while in the air. In the third place, these will be of great value for the defence of vulnerable points. Oil tanks, magazines, workshops, power houses, and all the other nerve centres of naval power have in the last few years been exposed to the indefinite menace of aerial attack.

Passive defence against such an attack is perfectly hopeless and endless. You would have to be on the roof of the world to be quite sure. Something may be done, and has to be done, by the provision of guns which fire upwards, and by searchlights which train throughout the entire arc. But the only real security which sound military principles will rely upon is that you should be master of your own air. Nor is this unduly difficult. The war aeroplane flying over its own country unhampered by floats and close to its own base must be a far more efficient fighting instrument than any similar aircraft that goes across the sea. When it comes to manœuvring or the carrying of guns or bombs the home aeroplane will have decisive advantages over the intruder. In the Military Wing we are in a position of effective strength, and any hostile aircraft, aeroplane or seaplane, which reach our coast during the coming year would be promptly attacked in force by a swarm of very formidable hornets. This is the true military protection of vulnerable points. We have built or ordered fifteen airships, of which ten are large or medium-sized vessels of over forty-five miles an hour speed. Later in the session I shall bring half-a-dozen of these vessels over the House of Commons in order that the doubts which may lurk in some breasts as to the existence of aircraft in possession either of the Naval or Military Wings may be dissipated. With regard to the airship, I must avow my belief in the future of the aeroplane, but it is undoubtedly true that the airship has a much wider radius of action. Forty-eight hours' radius of action is within the compass of the modern airship. It has a much greater carrying power, and it can work much more efficiently at night. We have got a thoroughly good *personnel* of officers and men, and the airship section will form in principle a second stage in the life of the aeroplane officer, and offer the prospects of a longer career than would be possible if he were to confine himself only to aeroplanes. Because there is no doubt that they fall exclusively in the province of youth—I mean that the work of flying an aeroplane requires a very young man. The loss of life during 1913 in the Naval Wing has been limited to three officers, of whom only one was killed in flying a naval aeroplane. 130,000 miles were flown in all weathers, and mainly across country, but of course we must expect a certain proportion of accidents, and in the air all forfeits are serious. As the seaplanes and airships extend their action seaward, as they will do this year and next year, some loss must also be expected from other causes than those with which we have hitherto had to reckon. Although the machines and flyers get better every month, they also fly in more dangerous wind. But I am satisfied that no unnecessary risks are run. Naval officers are very handy and are competent and good mechanics, and like their comrades of the Military Wing are very proud of having the opportunity to serve their country in so conspicuous a fashion in time of peace.

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A view of the Olympia Aero Show taken from the east of the hall.

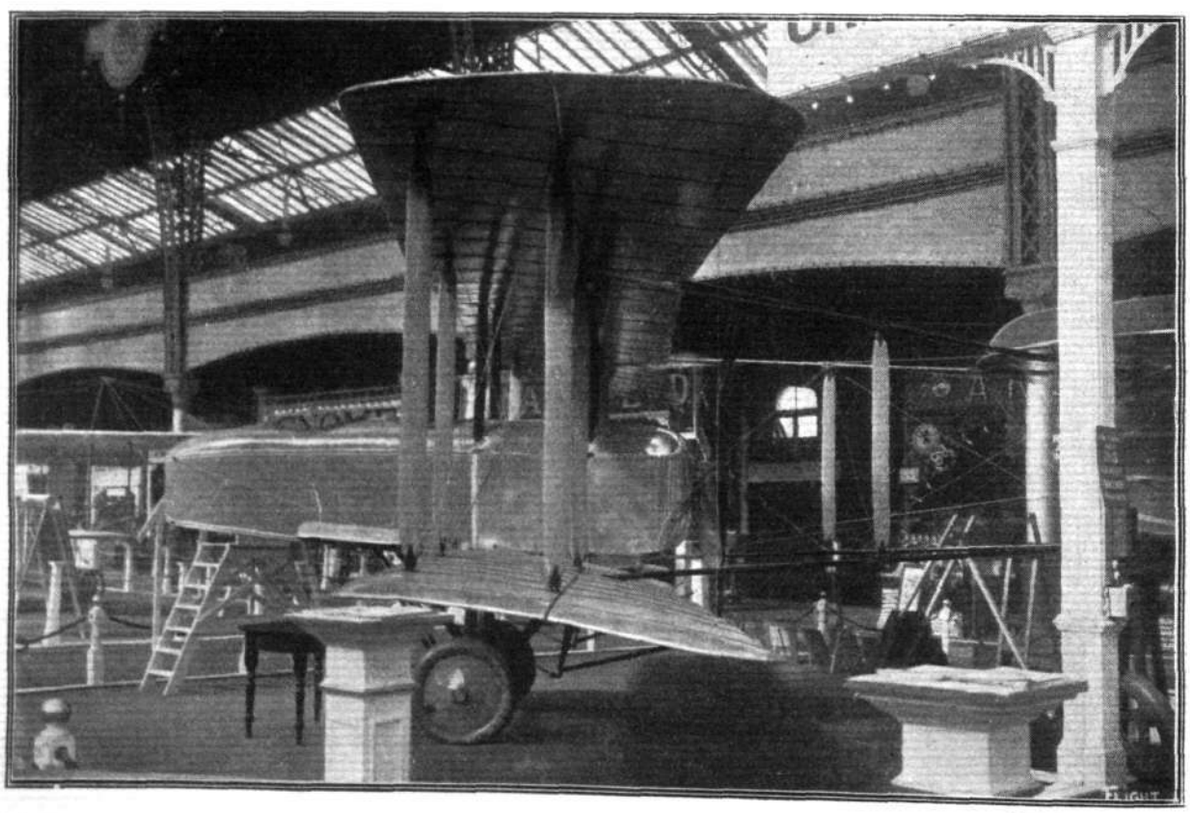
THE OLYMPIA

INTRODUCTION.

THE Fifth International Aero Exhibition should give the serious student of aeronautics much cause for thought. To say that the Show is interesting is to utter a platitude; but when we remark that it also indicates that much progress has been made, some further comment becomes necessary, as the advance in aeronautical science, except perhaps in one respect, is more real than is apparent. The exception we would make is in regard to the high standard of workmanship which is demonstrated in practically every machine exhibited; and, in this respect, too much praise cannot be lavished upon them, although it would be invidious to make distinctions. The reason for the comparatively little evidence of the progress that has been made is probably attributable to the fact that aeronautics has reached a stage of development when further advance along the lines upon which we are now working will be largely in regard to details, and as such will not be readily obvious to a casual observer, yet such progress will be by no means less material. As an illustration of this point, the wing construction on the Avro single-seater, the embodiment of the shield over the front of the *fuselage* with the propeller on the two-seater Bristol, the double cambered planes on the Wright seaplane, and the design of bat-boat on the Sopwith machine, although not all novelties, may be specifically mentioned, but there are ample evidences of the presence of other improvements that will readily occur to the close observer. And as regards the future, it is not at all improbable that designers will do much to facilitate transportation and storage, as with the marked increase in span and size, difficulties in this respect have been greatly augmented during the past year.

Of freak machines we may say that there are none. Not that there are no departures from what may be termed past practice, for the exhibits on the stands of Pemberton Billing and Perry Beadle differ slightly from that which has heretofore been usual, and their performances in practice should therefore prove of interest; certainly so far as the workmanship displayed is concerned, they leave nothing to be desired.

The distinct influence of military requirements upon design is clearly demonstrated; as, of the machines exhibited, no less than 13 are specifically stated to be either scouting or fighting aeroplanes, 8 of which are tractors and the remainder "pushers." On the fighting machines the propeller is always placed behind the wings, as would appear to be almost essential in order to obtain a sufficiently wide angle of fire for the gun, which is invariably placed in the front; but since the rotating propeller does not obstruct the field of vision to any marked degree, both types are used for observation purposes. That the requirements of the Army and the Navy should be so potent at the present time will be readily appreciated, since the commercial aspect of flying except for demonstration purposes, whose use is largely educational, has not so far attained any prominence;



Front portion of the new Grahame-White two-seater.

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FLIGHT

EXHIBITION 1914

but with the increase in the proportion of, as well as the actual, useful load capable of being carried, combined with the natural tendency towards greater reliability, the possibilities of aerial transport have been brought much nearer. At the present exhibition there are no less than eight machines that are capable of carry over 800 lbs., and sixteen have a useful load of 600 lbs. or over, the corresponding figures being 3 and 10 only twelve months ago, and four of the makes of machines then exhibited are not now being shown.

In steel construction there has not been the extensive use one might have been led to imagine would have been the case, having in view the extent to which it is adopted in some Continental machines, although a greater tendency is exhibited to employ this material largely for the landing gear, as is shown by the table given in FLIGHT last week.

The methods of construction used in assembling the various members of all-steel machines, are shown on the Vickers, the Clement-Bayard and the Nieuport stands, and are worthy of close study.

In regard to the engines exhibited, we have long passed that stage when lightness was the all-important factor, and now complete immunity from mechanical breakdown is demanded as an essential quality. Concerning those manufacturers who have been represented at previous exhibitions, we need say no more than this—that every make of engine has seen extensive employment on actual machines, not only in this county, but abroad also. And as regards the newcomers, the Sunbeam has already been proved on the M. Farman at Brooklands and in tests conducted at the R.A.F.; the Argyll is built by a firm of motor manufacturers who have a big reputation behind them; and the Stitax presents a novel construction that would appear to have great possibilities. There is, therefore, at the present exhibition a number of different types of engines of British manufacture and of tried design, and although in the past they have not been the commercial success that one would have liked, great hopes are entertained that the Military Aeroplane Engine Competition will do much to stimulate this branch of the aeronautical industry.

THE EXHIBITS.

AVRO (A. V. ROE AND CO.). (64.)

THREE machines of different types, all representing considerable departures in design from previous models, whilst at the same time retaining the good qualities that have established such an enviable reputation for this enterprising firm. Keenly alive to the various requirements of the Army and Navy, Mr. A. V. Roe has designed three entirely different types, each for a different purpose, one being a military biplane of the pusher type, and built with a view to meeting the demand for a machine affording the observer an unrestricted view, and also possessing facilities for the mounting of a gun if desired. The second machine is a small, fast, single-seater, designed for scouting purposes, whilst the third and last is a hydro-biplane. All three machines are fitted with 80 h.p. Gnome engines.

The 80-h.p. Military Biplane is of more or less standard design for this type of machine, as regards the general disposition of its component parts, but its designer has managed to incorporate in it numerous detail innovations. The *nacelle*, which is very wide and deep, is built up in the usual way of four ash *longerons*, connected by struts and cross-members of spruce, strengthened in places by steel tubes. Inside this *nacelle* are arranged the pilot's and passenger's seats, tandem fashion, the pilot occupying the rear seat, so that the observer has a clear view, while it is possible to have a gun mounted on the nose of the *nacelle*. The controls are of the usual Avro type, consisting of a vertical lever mounted on a transverse rocking shaft, from which cables are taken to the various control

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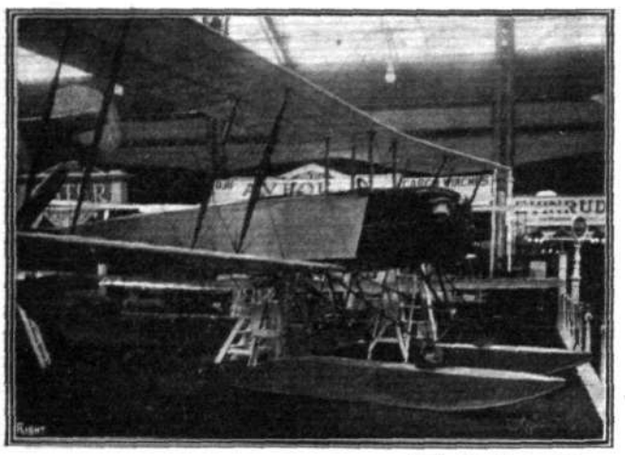
General view of the Avro stand.



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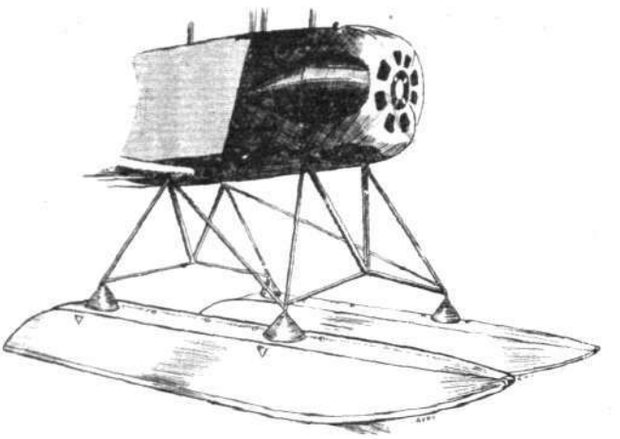
The Avro seaplane.



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Chassis and main floats of the Avro seaplane.

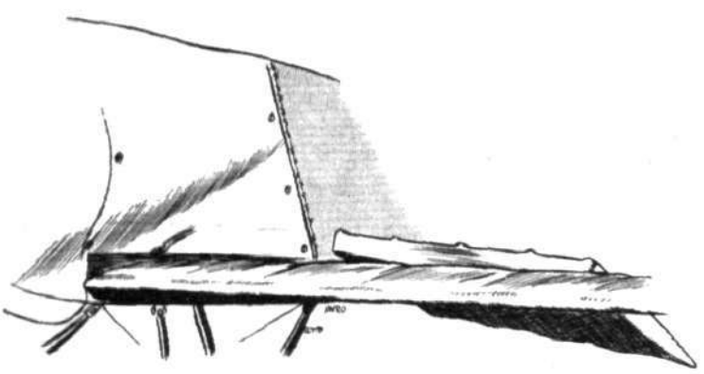
organs. The *ailerons* are operated by a side-to-side movement of the lever, while a to-and-fro movement actuates the elevator. A pivoted foot-bar controls the rudder.

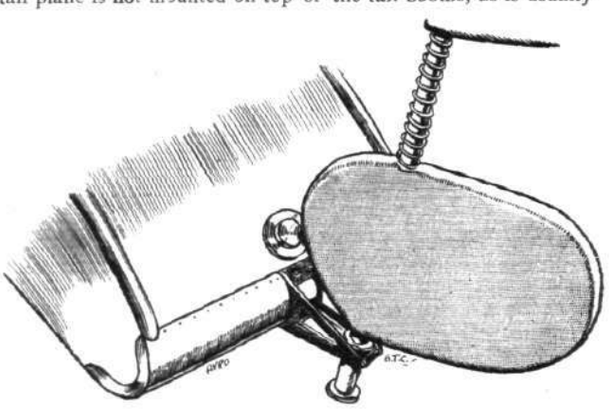
Behind the pilot's seat, and just in front of the engine, are the petrol and oil tanks, which have a capacity sufficient for a continuous flight of 4½ hours. The engine, which is mounted on double bearings in the rear of the *nacelle*, is almost entirely covered in by an aluminium shield secured to four tubular extensions of the *nacelle longerons*. At their rear extremities where they converge, these extensions carry one of the engine bearers, the other being formed by a pressed steel frame mounted on the *nacelle* proper.

For a machine of the pusher type the chassis is rather unusual, it being in fact exactly similar to the chassis fitted to the Avro tractor machines. It consists of a single central ash skid carried on two pairs of steel tube struts, and two wheels sprung in the usual way by means of rubber shock absorbers attached to the T pieces of the wheel struts. In order to diminish head resistance, the shock absorbers have been enclosed in streamline aluminium casings.

The tail planes are similar to those of the tractor machines, the mounting of the fixed tail plane, however, being rather unusual, for the tail plane is not mounted on top of the tail booms, as is usually the case, but encloses the rear portion of the booms. In order to facilitate dismantling, the portion of the tail booms which is enclosed by the tail plane, is hinged to the remainder of the tail booms by a joint immediately in front of the tail plane, and the necessary rigidity at this point is obtained by cable bracing to the rudder post.

The main planes are of standard Avro type, except that the dihedral angle does not extend throughout the whole length of the





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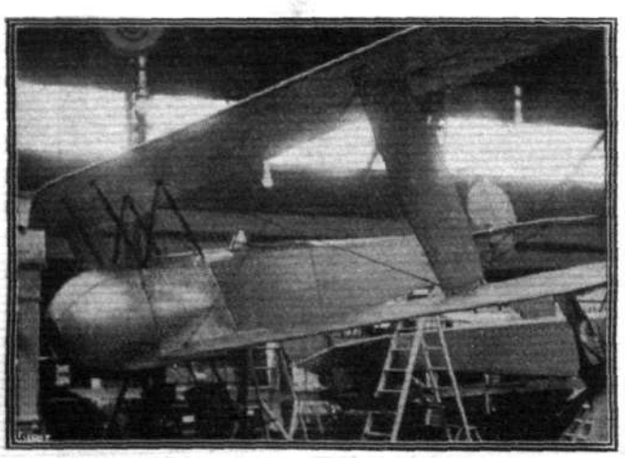
The air brake on the Avro scout and on right the water rudder on the Avro seaplane.



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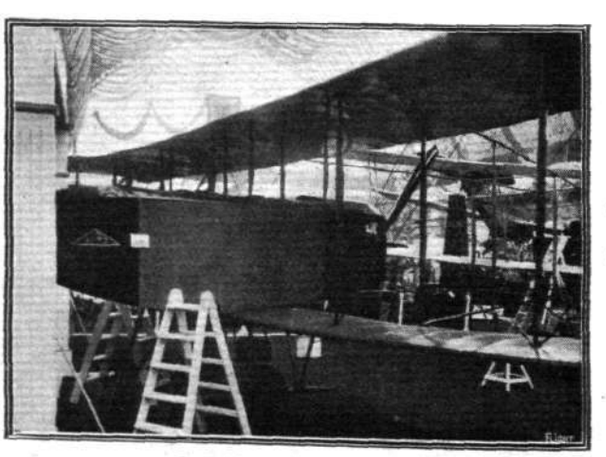
The Avro scout.



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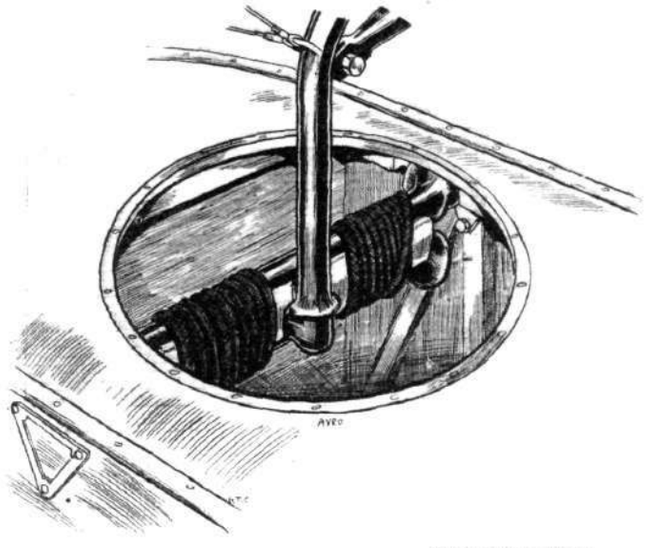
The Avro "pusher" biplane.

planes, the central portion out to the first pair of struts being straight, so that only the outer portion of the wings are set at a dihedral angle. The method of carrying the *aileron* cables to the crank levers is rather unusual, and is illustrated by one of the accompanying sketches. It will be seen that the pulley has been placed inside instead of on top of the wing, the cable passing through a small opening in the lower surface of the wing.

Of the remaining two machines on this stand

The 80 h.p. Single-seater Scout is perhaps the more interesting since it embodies so many novel features. The chassis, *fuselage* and tail planes of this biplane follows standard Avro practice throughout, and are similar in every way to those of the tractor biplane described in FLIGHT for December 6th last. It is mainly in the design of the wings and their bracing that this machine is remarkable.

The wings have a very pronounced backward slope so as to increase the stability, which latter is further enhanced by the usual dihedral angle. In section the planes are remarkable, in that they are absolutely flat on the under surface, whilst the upper surface is cambered in the usual way. This wing section is apparently one of the important factors for the very high speeds claimed for the machine, one of the others being the reduction of head resistance in the wing bracing. Only one pair of struts on each side separate the main planes, and a streamline casing around these struts further



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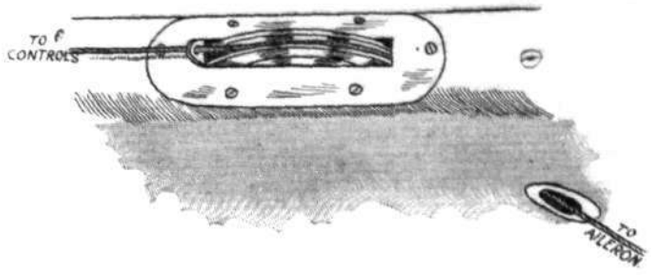
Detail of springing the floats on the Avro seaplane.

reduces the head resistance to that of a single strut on each side. The wing bracing is effected by two stranded cables running from the top and bottom respectively of the *fuselage* struts to a steel tube connecting the main spars at the point where these join the struts. Thus when the centre of pressure travels backwards and forwards, the load is always taken by both spars through the intermediary of the steel tube connecting them. *Ailerons* are hinged to the outer trailing edges of both planes, whilst air brakes for pulling the machine up quickly on landing are formed by pivoting the rear portion of the wing near the body. For checking the speed of the machine on alighting the pilot turns these air brakes by means of a lever until they are broadside on with regard to the line of flight.

The 80 h.p. Seaplane is similar to the land machines as regards its wings and *fuselage*, but possesses some very interesting features in the method of springing the floats. These are carried on a structure of steel tubes, of which the outer members are bent downwards inside the floats, where they are attached to another tube by means of rubber shock absorbers in the manner shown in one of the sketches. The opening in the deck of the float through which the



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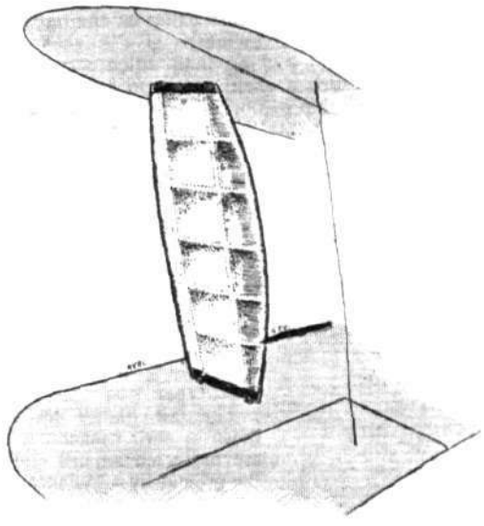
The *aileron* pulley in the Avro pusher.

tubular strut passes is afterwards covered with a flexible cover made made of diver's twill, so that although the floats are free to move several inches up or down no water is admitted inside them.

The main floats, of which there are two, are of the non-stepped



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The streamline casing round the plane struts of the Avro Scout.

variety, and are also covered with diver's twill, which has been found to be more satisfactory than fabric, as it does not tear so easily, although it is undoubtedly somewhat heavy. The floats are divided by bulkheads into 11 watertight compartments, so that should one of them spring a leak the remaining ones would still possess sufficient buoyancy to keep the machine afloat. The pilot's and passenger's seats are arranged tandem fashion, the pilot controlling the machine from the rear seat by means of the usual Avro controls.

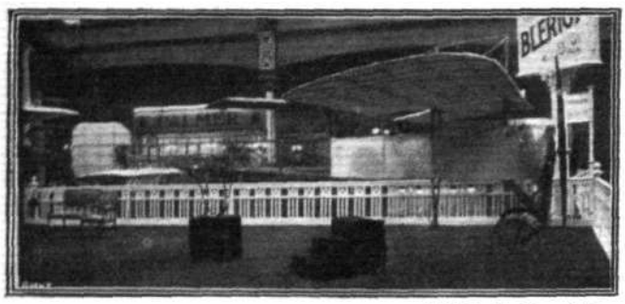
A small float protects the tail planes against contact with the water, whilst a small water rudder mounted just behind the tail plane on an extension of the rudder post enables the pilot to steer the machine at slow speeds on the water.

Common to all the three machines is an extremely neat instrument board of Avro design, comprising altimeter, clock, compass, air speed indicator and revolution indicator, and all the machines are furthermore fitted with the Avro safety belt, the design of which is already known to the majority of our readers.

BLÉRIOT L. (BLÉRIOT). (69).

NEATLY displayed on the largest stand at the Show are the Blériot monoplanes—a tandem two-seater of the well-known type, a hydro-monoplane, and a single-seater military monoplane.

Total Visibility Type Monoplane.—This is probably the most interesting of these machines. The most characteristic feature is the disposition of the wings, which have been raised some distance above the *fuselage*, to provide an unrestricted view in all directions. The height of the wings above the *fuselage* is such, that the rear spar, which is situated immediately in front of the pilot, is on level with his eyes, so that there is only the thickness of the plane to obscure his view, and this can easily be overcome by either stooping slightly in order to look under the plane or by stretching slightly in order to look over it. For scouting purposes this arrangement would seem to be ideal, and we understand that the French Army has purchased several of this model, which was only adopted as a standard type following the success of the first experimental machine in the hands of French officers. One gathers that there is no appreciable difference between flying one of these machines and one of the standard monoplanes with the wings placed further down, so that with all the good qualities of the standard Blériot and the added advantages of total visibility, this machine should be a valuable addition to the list of military machines in this country, where they will be built as soon as the factory at Brooklands is ready.



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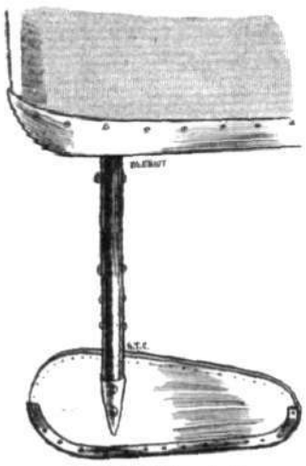
Total visibility type Blériot monoplane.

Except for the raising of the main planes this machine is similar to the already well-known No. XI type. The engine—an 80 h.p. Gnome—is mounted between double bearings in the nose of the *fuselage*. Between the engine and the pilot's seat inside the *fuselage* are the two cylindrical petrol and oil tanks, whilst an additional supply of petrol is carried in another tank behind the pilot's seat.

Petrol is forced from this main tank to the service tank in front by means of a hand-operated pressure pump on the right-hand side of the pilot's seat. Control is by means of a single vertical lever mounted on a longitudinal rocking shaft which carries at its rear end a sprocket from which a chain passes to another sprocket on the lower end of the bottom pylon. The warping wires pass round a pulley on the same shaft as the pylon sprocket and it will thus be seen that the "*cloche*" has been discarded. This applies to all the machines exhibited and we gather, to all future machines.



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The water rudder on the Blériot hydro.

The main planes are mounted on four short struts resting on the upper *longerons* of the *fuselage* as shown in one of the accompanying sketches. Owing to the raised wings the angle on the lift wires is particularly good, as is also the angle on the upper bracing wires which are secured to a *cabane* of the usual type.

The tail planes are similar to those of earlier machines and they are protected against contact with the ground by a Malacca cane skid.

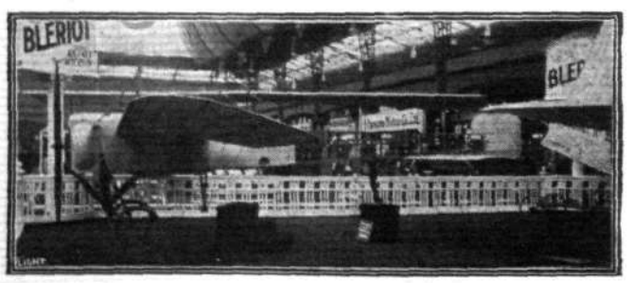
The 80 h.p. Seaplane does not differ materially from the machine exhibited at the Paris Show and fully described in our report at that time. One of the chief alterations appears to be a shortening of the chassis by carrying the cross member under the lower *longerons* instead of, as then, under the upper *longerons*.

The chassis is illustrated by the accompanying sketches and photographs which are self explanatory.

The two main floats, of the non-stepped type, have been built by the well-known Tellier firm.

A small float protects the tail planes against contact with the water, and a water rudder mounted on an extension of the rudder post enables the machine to be steered when taxying at low speeds.

The two seats are arranged tandem fashion as in the land machines, but appear to have been moved closer together, no doubt with a view to reducing the longitudinal moment of inertia. The same applies to



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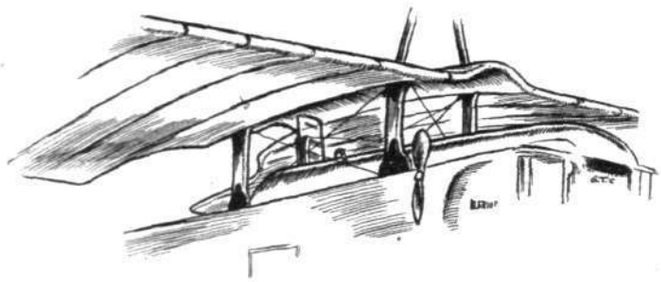
Tandem two-seater Blériot.



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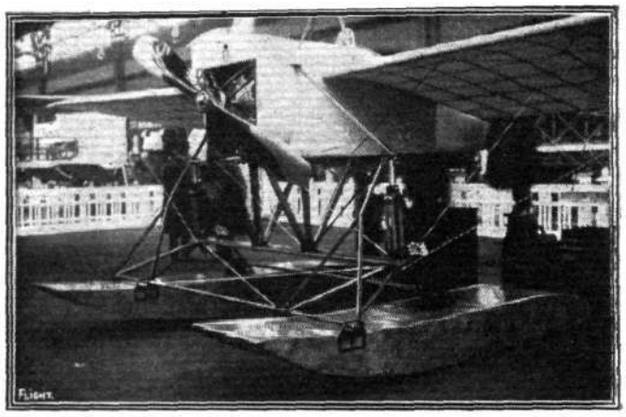
Sketch showing method of mounting the wings on the visibility type Blériot.

The 80 h.p. Tandem Two-seater, which otherwise appears to be similar in every way to those already in use in this country, and with which the majority of our readers are familiar.

The *fuselage* is of a similar construction to that of the Visibility type machine, but is slightly longer. The pilot's and passenger's



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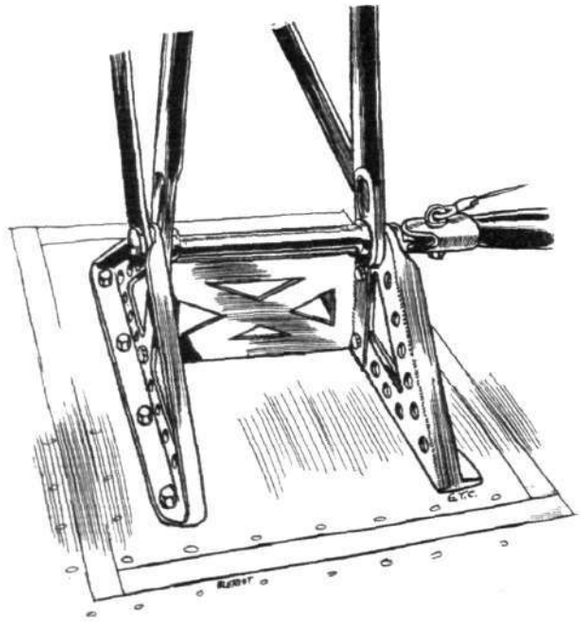
Chassis of the Blériot hydro.

seats are arranged in tandem, the pilot occupying the front seat, which is situated between the front and rear spars. The passenger's seat is immediately behind that of the pilot, while the trailing edges of the wings have been cut away near the body in order to give the passenger a better view in a forward and downward direction.



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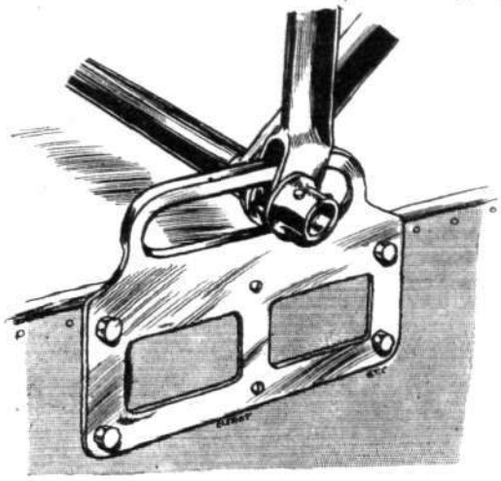
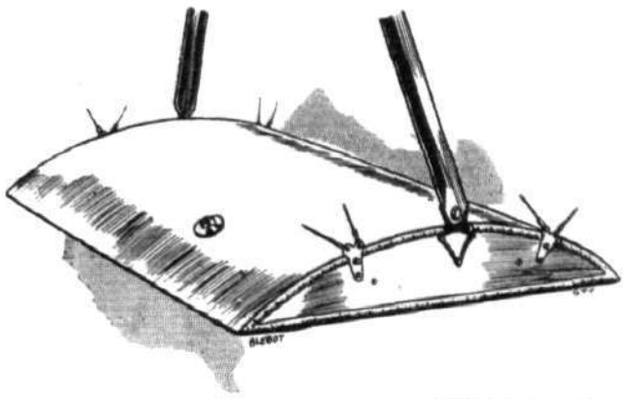
Attachment of chassis forks to float on Blériot hydro.

The chassis is of the usual Blériot type, but joins the body behind the engine instead of in front of it, as in the single-seater. The cylindrical oil and petrol service tanks are mounted longitudinally inside the *fuselage* between the pilot and engine, whilst the main petrol tank is carried in the *fuselage* behind the passenger's seat. In the machine shown, this tank is covered by a streamline cowl.





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Attachment of front chassis members on Blériot hydro; on the right the tail float.

The tail planes are as usual, consisting of a fixed tail plane mounted under the rear end of the *fuselage* and braced by steel tubes, to the trailing edge of which is hinged the divided and negatively cambered elevator. The rudder is partly balanced by a portion of it projecting in front of the rudder bar.

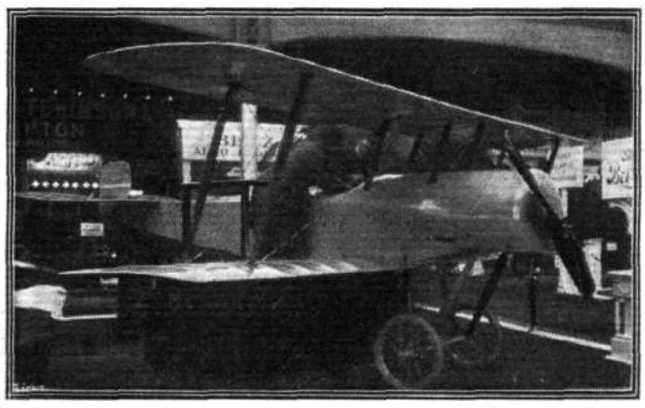
A swivelling tail skid carried on a structure of steel tubes, and sprung by means of rubber bands, protects the tail planes against contact with the ground.

In addition to the three machines described above, there is shown one of the *aeroplages*, or sand yachts, which have attained no small measure of popularity in France, and which would provide quite a lot of sport if introduced at some seaside resorts. It consists of a framework of steel tubes, carrying the four wheels, of which the front ones have the wider track than those at the rear. On top of these transverse tubes are mounted two ash members running longitudinally from which the seats are slung. A steering column slopes backward to the driver's seat, and carries at its upper end an ordinary steering wheel, whilst at its lower extremity it has a bobbin, over which cables pass to the rear wheels via two pulleys on the ash members. The whole affair is very lightly built, and should be capable of a fair speed in a wind.

BRISTOL. (BRITISH AND COLONIAL AEROPLANE CO., LTD.) (43).

THE two biplanes exhibited on this stand differ considerably from previous models, the two-seater bearing hardly any resemblance to its prototype shown at Olympia last year, whilst the small fast single-seater scouting machine may be said to be the first of a new type to be turned out by this firm.

In the **80 h.p. Two-seater Biplane** an attempt has been made to provide a good streamline form of *fuselage* by adding curved super-and sub structures to the main rectangular portion and by continuing the engine cowl forward in the shape of a hemispherical nose-piece mounted on and revolving with the propeller boss. In order to provide better cooling, this nose-piece is louvred, so that although the engine is totally enclosed the cooling should present no difficulties. The engine, an 80 h.p. Gnome monosoupape, is mounted on overhung bearings in the nose of the *fuselage*, and drives directly the Bristol propeller. The *fuselage* is built up in the usual way of four *longerons*, which are of ash in the front portion, and of spruce, spindled down to an I-section, at the rear, connected by struts and cross-members of ash and spruce. The turtle back on top of the *fuselage* is constructed of three-ply wood up to a point behind the pilot's seat, whilst the rear portion of it is formed by longitudinal wooden stringers covered with fabric. The structure underneath the *fuselage* is formed in the same way by fabric-covered stringers.



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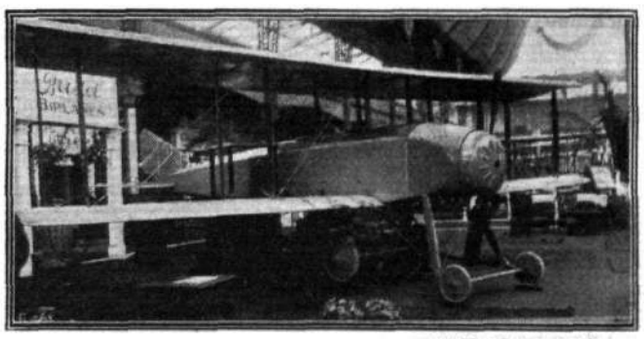
The Bristol scout.

The chassis is of the already well-known Bristol type, consisting of four struts carrying two skids, from which are in turn sprung the four wheels, the only noticeable alteration in the chassis appears to be that the rear pair of struts are now sloping backwards instead of coming straight down, an arrangement which, we feel inclined to think, would impose considerable strain on the diagonal cross-wiring. Now, as before, the chassis struts are made of spruce and the skids of ash, whilst the tubular steel axes are streamlined with wood.

The wings appear to be similar to those fitted on the machine exhibited at the Paris Show, and are of a peculiar section, being practically flat on the upper surface between the two main spars. By means of quickly detachable fittings the wings can be readily removed from the centre section for purposes of storage or transport.



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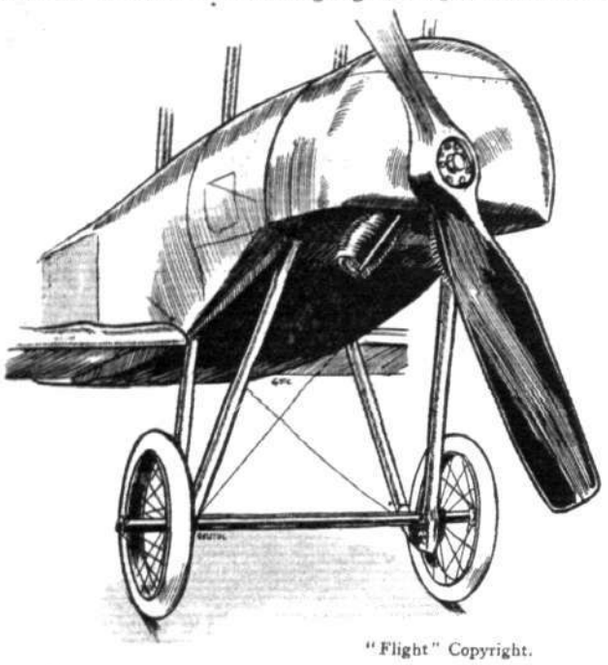
The Bristol tandem two-seater.

The main spars are attached to the *fuselage* by means of a steel clip and horizontal bolt, as illustrated by one of the accompanying sketches. Cane skids are fitted to the wing tips in order to protect them against contact with the ground. The pilot's and passenger's seats are arranged very comfortably, tandem fashion, in two separate cockpits, the pilot occupying the rear seat. The controls are of the usual Bristol type, consisting of a wheel mounted on a central column, for warp and elevator, whilst a pivoted foot-bar operates the rudder. In front of the pilot is an unusually neat instrument board, on which is mounted in addition to the usual set of instruments, an electric signalling device, consisting of a series of small electric bulbs marked in the following

order: "Up," "right," "left," "circle," "steady," "return," "down," "land." By means of a series of buttons in the observer's cockpit, similarly marked, the observer can give the pilot orders unhampered by the noise of the engine.

The tail planes consist of a fixed tail plane, set at a negative angle of incidence, and to the trailing edge is hinged the undivided elevator, while it is surmounted by a small vertical fin to the trailing edge of which the rudder is hinged.

A tail skid of laminated wood similar to that fitted on the Paris Show machine protects the tail planes against contact with the ground.



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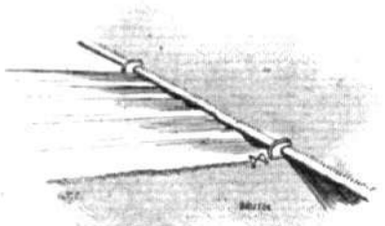
Chassis and engine housing on Bristol Scout.



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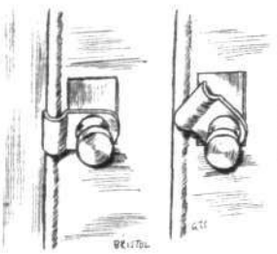
Attachment of tail plane on Bristol Scout.



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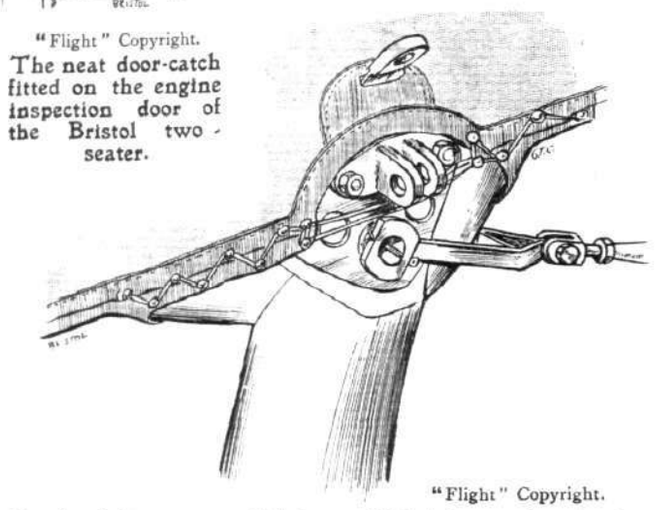
The neat door-catch fitted on the engine inspection door of the Bristol two-seater.

means of rubber shock-absorbers. The rather wide and deep *fuselage* is built up in the usual way, and entirely covered in by aluminium in front and fabric in the rear. An 80 h.p. Gnome is mounted on overhung bearings, and almost entirely covered in by an aluminium shield.

The main planes, similar in section, although on a reduced scale, to those of the two-seater, are separated by one pair of struts only on each side, and are attached to the *fuselage* by means of a steel clip and vertical bolt through the spars. The pilot is accommodated on an aluminium seat of the bucket type, and controls the machine by means of a single central column and a foot-bar. The column terminates in a double handle similar to those fitted on the Prier-type Bristol monoplanes.

The tail planes consist of a flat non-lifting fixed tail plane mounted on top of the *fuselage*, and of a divided elevator. The rudder is of the balanced type, and no vertical tail fin is fitted. A small pivoted tail skid, sprung by means of rubber shock absorbers inside the *fuselage*, protects the tail planes.



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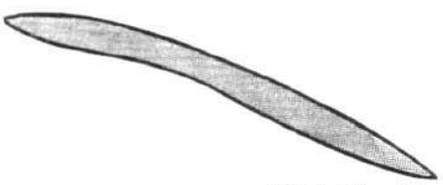
Sketch of the neat steel fitting which joins a chassis strut and a wing spar to the lower *longeron* of the *fuselage* of the two-seater Bristol.



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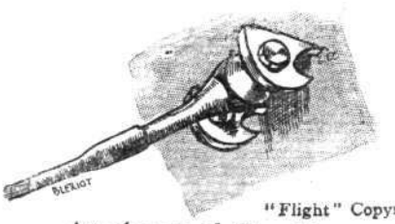
Wing section of the Bristol Scout.



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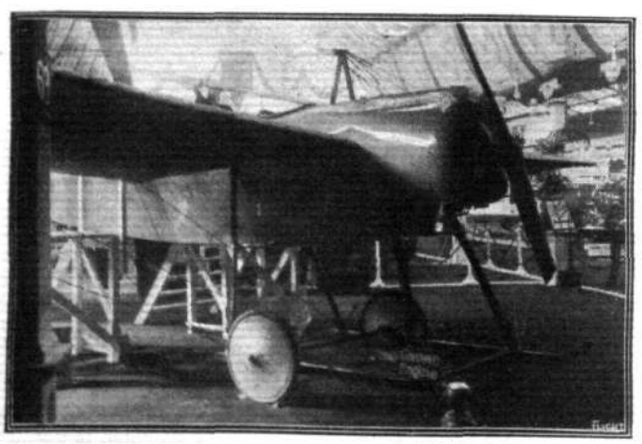
Attachment of lift cable.

In the **80 h.p. Scouting Machine** both the span and the chassis appear to have been reduced to a minimum, for the span is only 22 ft. and the chassis is of the simplest imaginable form, consisting of two pairs of V struts of spruce, from which the axle is slung by



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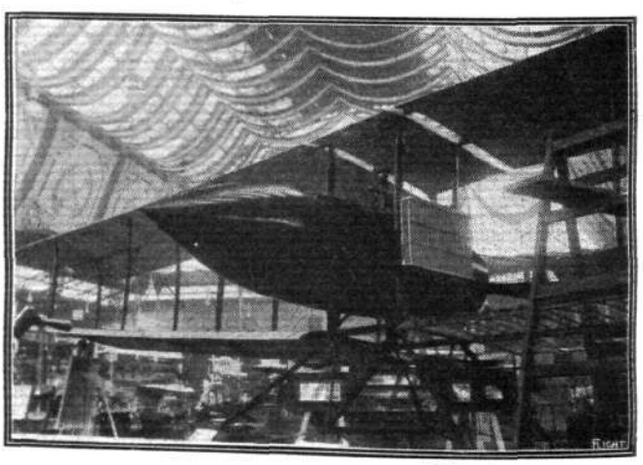
Chassis and engine housing of Blackburn monoplane.



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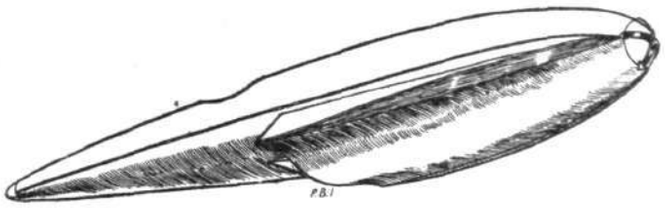
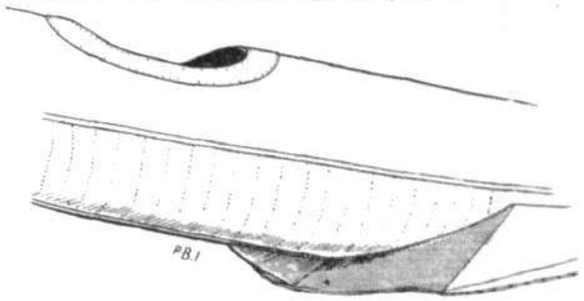
The Hamble River Co.'s seaplane.

FLIGHT

THE SUPERMARINE P.B. 1 (PEMBERTON BILLING). (49.)

AMONGST the newcomers at the Show, one of the most original machines is the flying boat exhibited by Mr. Pemberton Billing. This machine differs radically from any flying boat hitherto turned out in this or any other country, and is an attempt to produce, as





View from underneath of the hull of P.B. 1, and on right the step in the hull.

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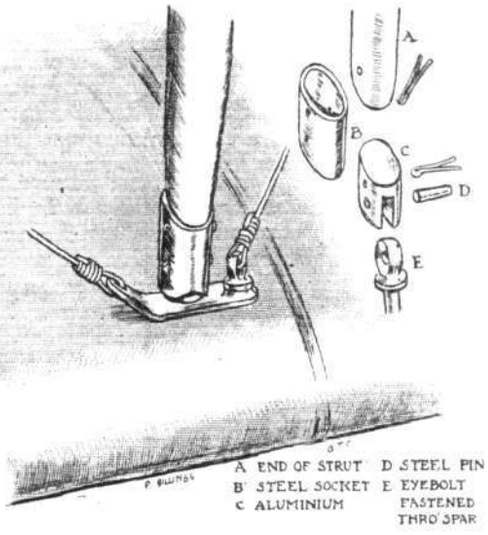
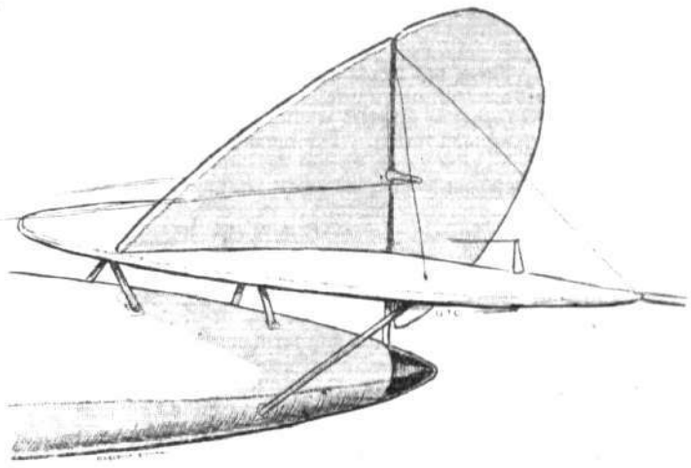
Mr. Pemberton Billing puts it, a boat that will fly rather than an aeroplane that will float. The construction of the cigar-shaped hull is very interesting. The upper portion of the hull consists of two



three and two thicknesses. The step of the boat, which forms a separate structure, riveted to the main hull, is built up of spruce, mahogany, rock elm and ash, beginning with the weaker wood near the nose of the boat, and having the strongest wood at the step where the greatest load is taken.

It will thus be seen that strength is obtained where necessary, not



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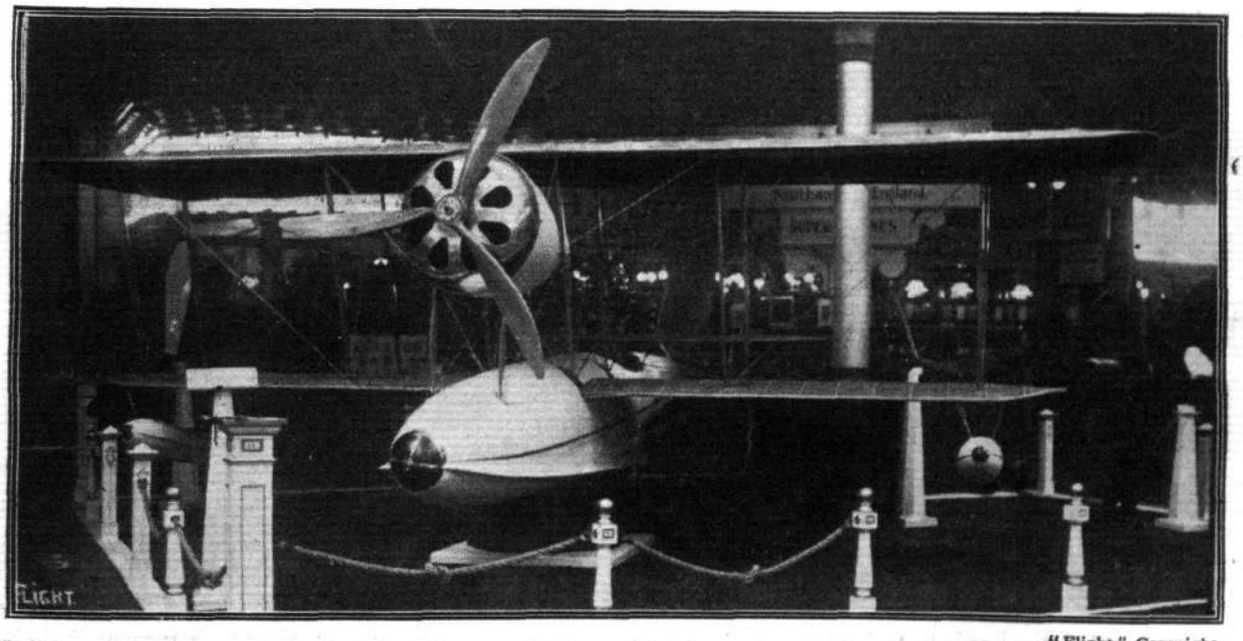
One of the strut sockets on the supermarine P.B. 1, and on the right the tail planes.

layers of spruce, whilst the thickness of the lower portion of the hull has been very carefully proportioned according to the strains only by bulk, but also by careful selection of the materials best suited for the purpose. In addition to this, the circular construction



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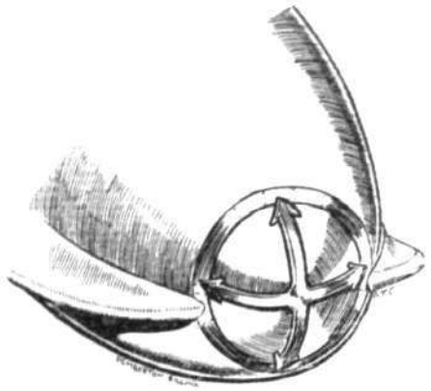
Pemberton Billing supermarine P.B. 1.

of the hull has the advantage that a pressure applied at any point is transmitted to the whole surface, thereby making it possible to reduce the weight to a minimum and yet preserve the necessary strength. The weight of the hull is only about 200 lbs. Further rigidity is added to the boat by internal cross-bracing of the



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Nose and grapnel of P.B.1.

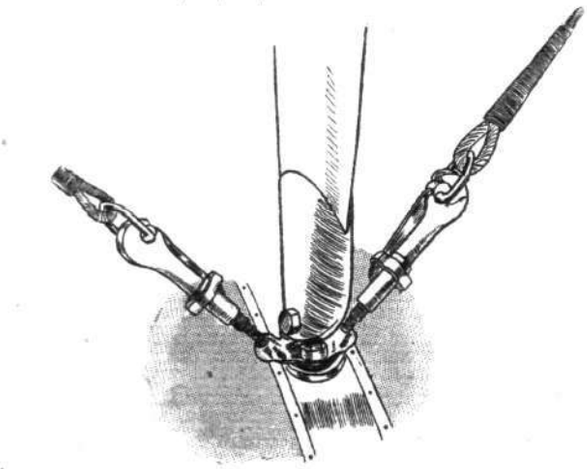
usual type, and bulkheads divide the boat into watertight compartments. These bulkheads are fitted with manholes in order to allow of adjustment of the internal cross-bracing. In the nose of the boat rests an anchor or grapnel, which, on being released, is shot forward by a strong coil spring. The anchor cable passes round a drum in front of the pilot's seat, so that the pilot is able to lower or hoist his anchor without leaving his seat. Interesting as the design and construction of the boat itself undoubtedly is, the engine mounting is even more so, for instead of mounting the engine as it is usually done, either in the boat itself or between the inner plane struts, Mr. Billing has mounted it in a streamline casing of wood, which also encloses the tanks. The rear portion of this casing is secured to the two front inner plane struts, whilst an additional two struts running from the engine down to the deck of the boat take the weight of the engine, a 50 h.p. Gnome driving directly a three-bladed propeller. The main planes, which are perfectly straight, that is to say, they have no dihedral angle, are set at an angle of incidence of 3 degrees. They are separated by spruce struts, and cross-braced in the usual way by stranded cables. The lower wing tips are protected by floats of a similar construction to that of the boat. By introducing springs in the cross-bracing of the floats these are allowed to travel backwards and upwards, thus adapting themselves to undulations of the water. One of the accompanying sketches shows the tail planes, which are mounted on a small structure of steel tubes. The pilot's seat, which is situated just to the rear of the lower plane rear spar, is made quickly detachable, so that in case of accident the pilot can throw it overboard, and as it possesses sufficient buoyancy to keep a man afloat, it serves the purpose of the lifebelt frequently worn by pilots of waterplanes. Control is by means of a single central lever and a pivoted foot-bar.

In addition to the complete machine, there is shown on this stand a scale model of the Supermarine P.B. 3, which Mr. Pemberton Billing was unable to get finished in time for the Show. This machine will be fitted with two Austro-Daimler engines placed in the hull, and driving the propeller through bevel-gearing. Another interesting item is the Supermeter, which indicates to the pilot his height above the surface from a height of 15 ft. downwards. As this instrument was fully described in these columns last week, further reference is unnecessary. Some examples of the three-bladed propellers with which the Supermarines are fitted will be found to be well worth a careful inspection.

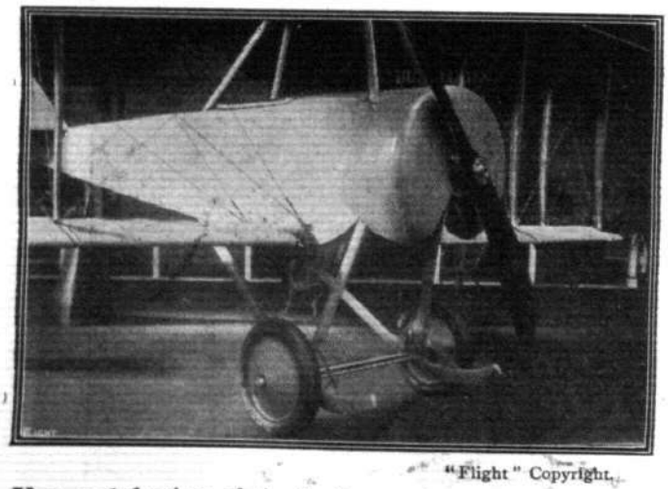
E.A.C. (EASTBOURNE AVIATION CO.). (70.)

ARE showing an 80 h.p. Tractor Biplane, which is chiefly remarkable for the ease with which it can be erected and dismantled. Owing to the non-arrival of the particulars relating to the exhibit on this stand until too late for inclusion in our last issue, we were precluded from furnishing details respecting it. The machine is fitted with an 80 h.p. Gnome engine, mounted on overhung bearings in the nose of the *fuselage*, and covered in by an aluminium shield. The *fuselage*, which is entirely covered in, is built up in the usual way and follows standard lines. Inside this *fuselage* are arranged the pilot's and passenger's seats, tandem fashion, with the pilot in front. Control is by means of a single central lever and a foot bar. The chassis, which is of rather unusual type, consists of streamlined steel tubes, of which the rear ones are curved forward and upwards to form short skids. The tubular axle, which rests in slots in the V between the tubes, is sprung by rubber shock absorbers, and carries the two wheels, which are fitted with large size Palmer tyres.

The main planes, of which the trailing edge is slightly longer than the leading edge, are separated by four pairs of poplar struts, in addition to two pairs of steel tube streamlined struts running from



Attachment of plane strut and quick release devices on the E.A.C. biplane.



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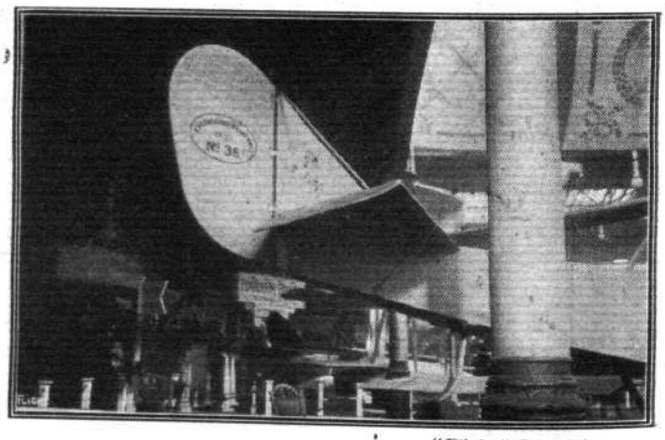
Nose and *fuselage* of the Eastbourne Aviation Co.'s 80 h.p. tractor machine.



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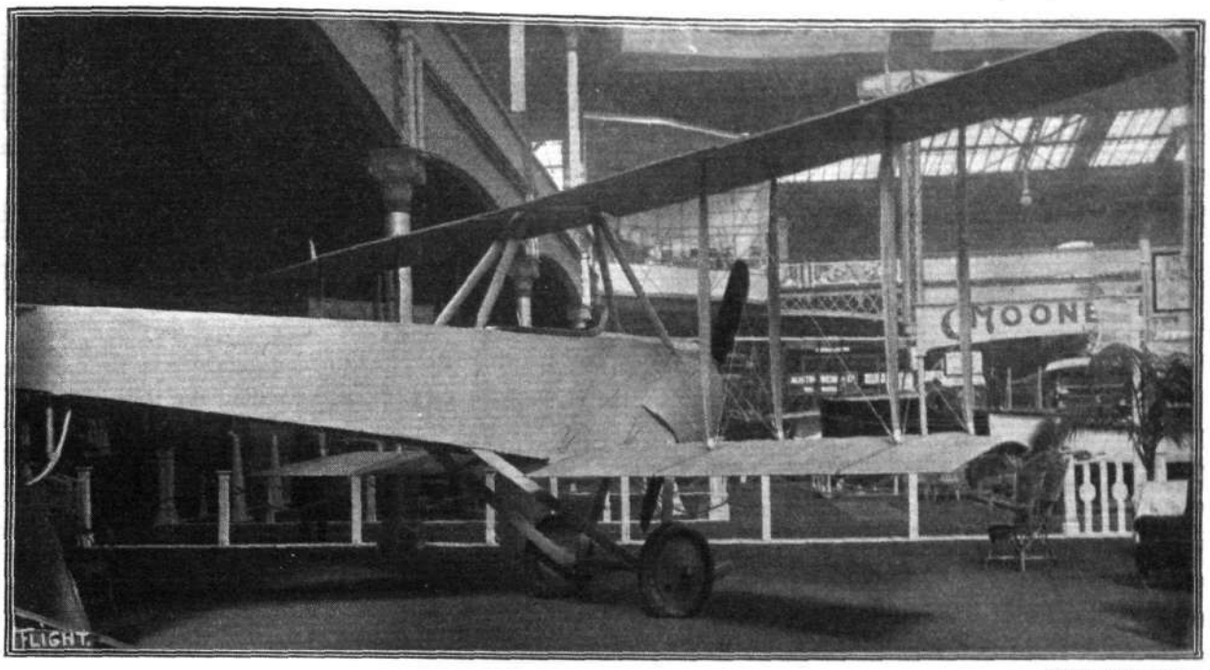
Tail planes and rudder of the Eastbourne Aviation Co.'s 80 h.p. tractor biplane.



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A three-quarter rear view of the 80 h.p. tractor machine exhibited on the Eastbourne Aviation Co.'s stand.

the centres of the front and rear spars, and sloping down to the *fuselage* to a point on the upper *longerons* immediately above the point of attachment of the chassis struts to the lower *longerons*. Cross bracing of the wings is effected by means of stout stranded cables, each of which is fitted with the combined quick release device and wire strainer shown in the accompanying sketch. It is only a few minutes' work to undo these quick releases and the bolts which secure the spars to the *fuselage*, and the wings can then be folded flat for packing or transport. The tail planes are so mounted on the *fuselage* that they can, by undoing a few bolts, be folded down flat along the sides of the *fuselage*, and thus take up very little room. In order to provide the pilot and passenger with a better view of the ground below, the wings have been left uncovered near the *fuselage*, and the portion of the spars which is thus left uncovered is enclosed in a streamlined casing. The main characteristics of this machine are :—

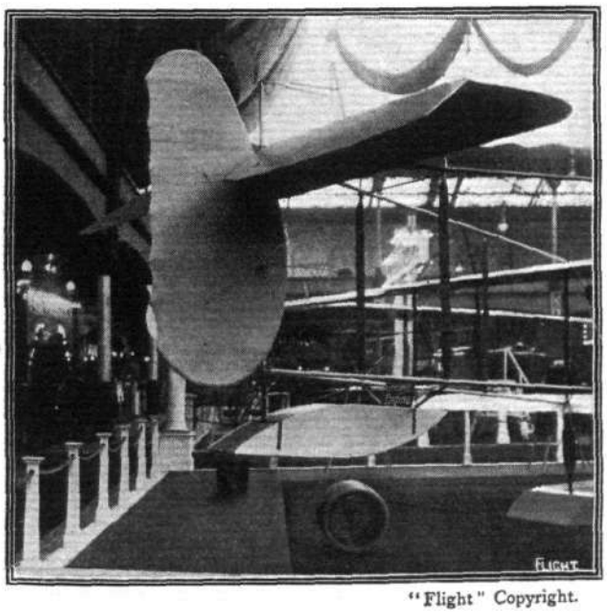
Span of upper plane ...	36 ft.	Weight ...	950 lbs. empty
,, lower ,, ...	30 ft.	Speed	50–75 m.p.h.
Length	24 ft.		

FARMAN (AIRCRAFT MANUFACTURING CO.), LTD. (41.)

ON this stand are shown two complete machines, one Henry Farman seaplane and a Maurice Farman land machine.

The 80 h.p. Henry Farman Seaplane follows general Henry Farman practice as regards its wings, *nacelle* and tail-planes, but in the chassis and float attachments numerous improvements have been effected. The main floats, of which there are two, are of the plain non-stepped type, and are sprung by rubber shock absorbers in the manner shown by the accompanying sketches. Each float is allowed to move up or down independently of the other, and also to rock slightly round its longitudinal axis, thus providing great flexibility, and minimising very considerably the shock of alighting. A single tail float of the same type as the main floats supports the tail planes when the machine is at rest.

An inspection of the interior of the *nacelle* reveals a lot of



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Tail planes and float of H. Farman seaplane.

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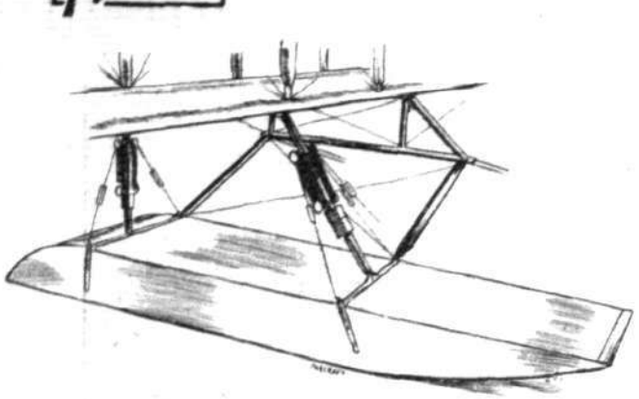
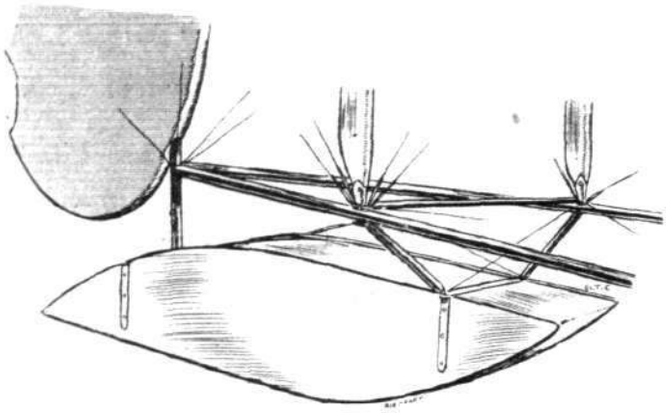
Nacelle and chassis of H. Farman seaplane.





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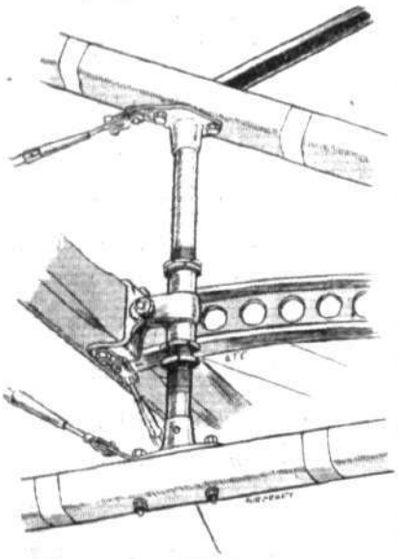
One of the main floats with its attachment on the H. Farman seaplane, and on right the tail float.

interesting instruments not usually fitted on the land machines, such as a wireless installation (Rouzet system). This apparatus when demonstrated never fails to attract a crowd of interested onlookers. The engine, an 80 h.p. Gnome, can be started from the passenger's seat by means of a starting handle passing through the petrol tank.

The pilot's and passenger's seats are arranged tandem fashion, and are mounted on a very roomy tool-box. The passenger occupies the rear seat, on which is mounted the transmitting key of the wireless apparatus. The rest of the machine, as has been already said, follows standard practice, and is so well known that a detailed description of it is unnecessary.



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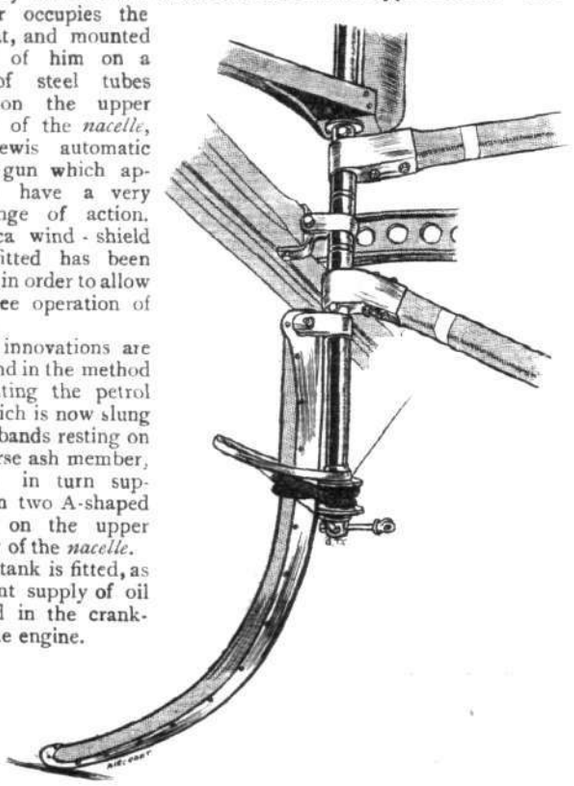
Sketch showing method of adjusting the angle of incidence of the tail plane on the M. Farman.

The 70 h.p. Maurice Farman is similar to the machine which was flown recently at Hendon, and of which we published at that time an illustration in these columns. The chief alteration in this machine is of course the disappearance of the front elevator, but several other alterations have been effected, for instance, in the tail outrigger and the tail planes themselves. In this machine the tail planes consist of a fixed tail plane of the monoplane type, to which is hinged the elevator, and which is surmounted by twin rudders. The angle of incidence of the tail plane is adjusted in an ingenious manner shown in one of the accompanying sketches, which is, we think, self-explanatory. The arrangement of the pilot's and passenger's seats is somewhat different to that of the older type, for the pilot now occupies the rear seat, from which he controls the machine by means of the usual Maurice Farman-type control. The passenger occupies the front seat, and mounted in front of him on a tripod of steel tubes resting on the upper *longerons* of the *nacelle*, is a Lewis automatic machine gun which appears to have a very wide range of action. The mica wind-shield usually fitted has been removed in order to allow of the free operation of the gear.

Other innovations are to be found in the method of mounting the petrol tank, which is now slung in steel bands resting on a transverse ash member, which is in turn supported on two A-shaped brackets on the upper *longerons* of the *nacelle*.

No oil tank is fitted, as a sufficient supply of oil is carried in the crank-case of the engine.



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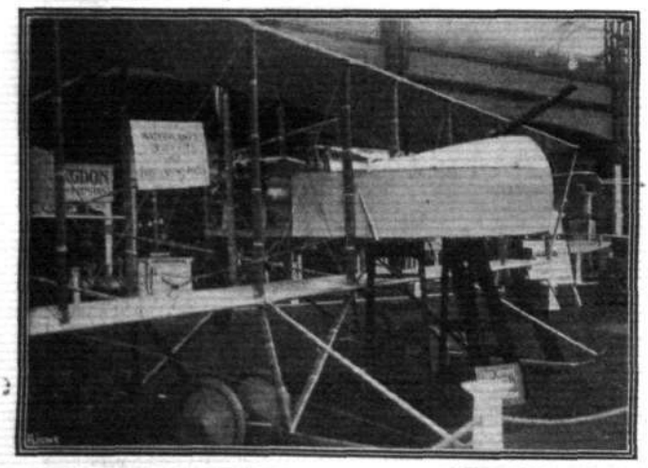
One of the tail skids of the M. Farman.



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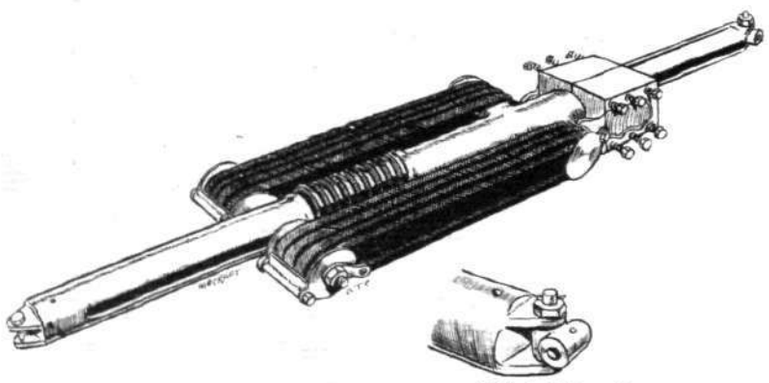
Nacelle and chassis of M. Farman biplane.



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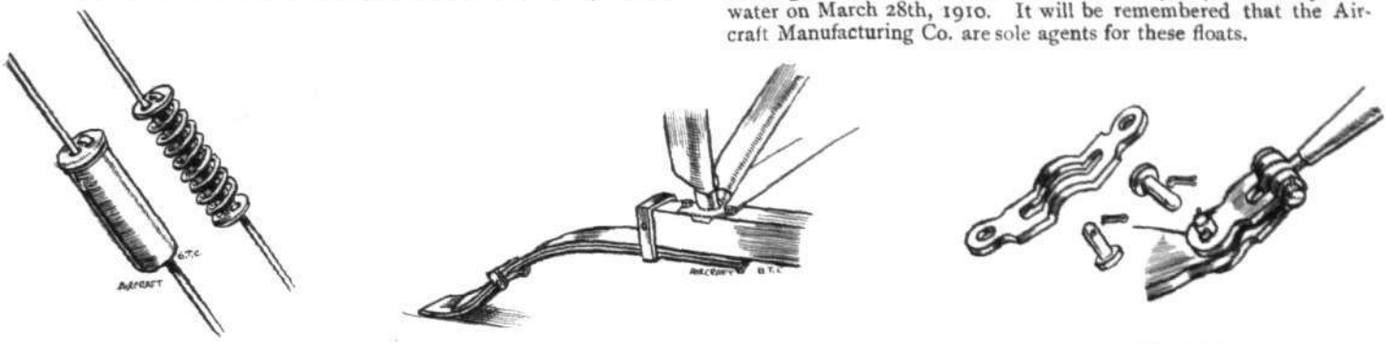
Detailed sketch showing method of springing on H. Farman seaplane.

In addition to the two complete machines just described, there are shown on this stand two *nacelles*, one Henry and one Maurice Farman, and various excellent examples of acetylene welding, sockets, finished parts, and model patterns of tanks, which, like the complete machines, bear evidence of the high-class workmanship which has established such an enviable reputation for this firm. Quite an interesting item in the exhibits on this stand is one of the original Fabre floats used on the first hydroplane to fly over water on March 28th, 1910. It will be remembered that the Aircraft Manufacturing Co. are sole agents for these floats.



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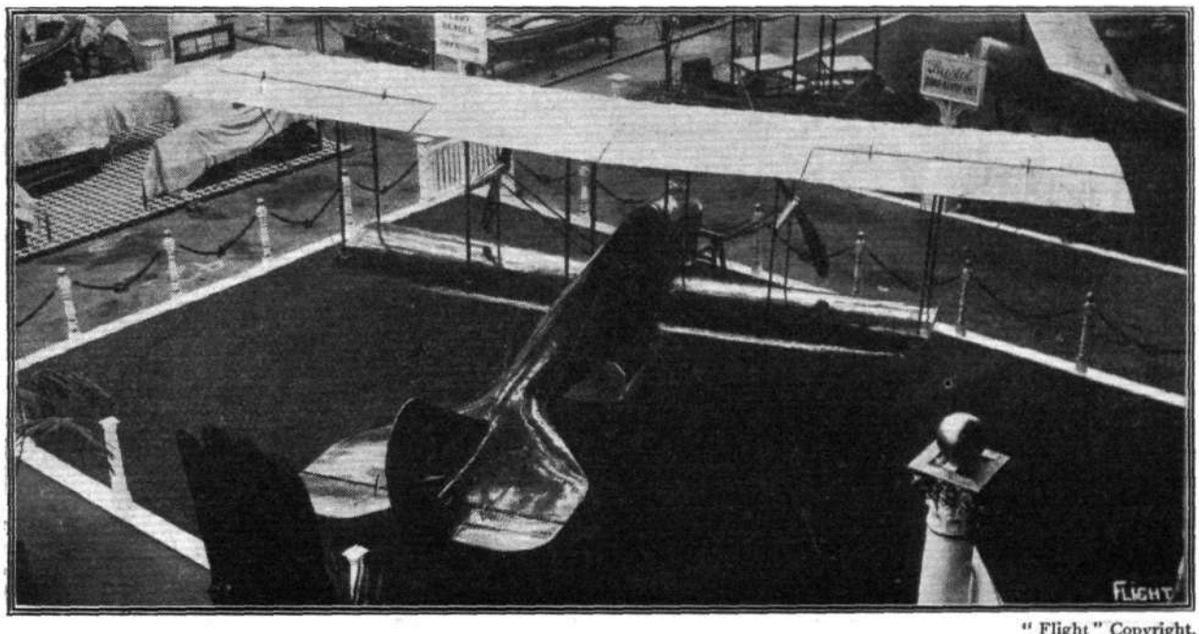
Left, the coil springs incorporated in chassis stay wires on Henry Farman seaplane. Centre, the leaf spring skid on the heel of the main skid of the M. Farman. On right, a neat steel clip which takes the place of the usual chain link on the Farman.



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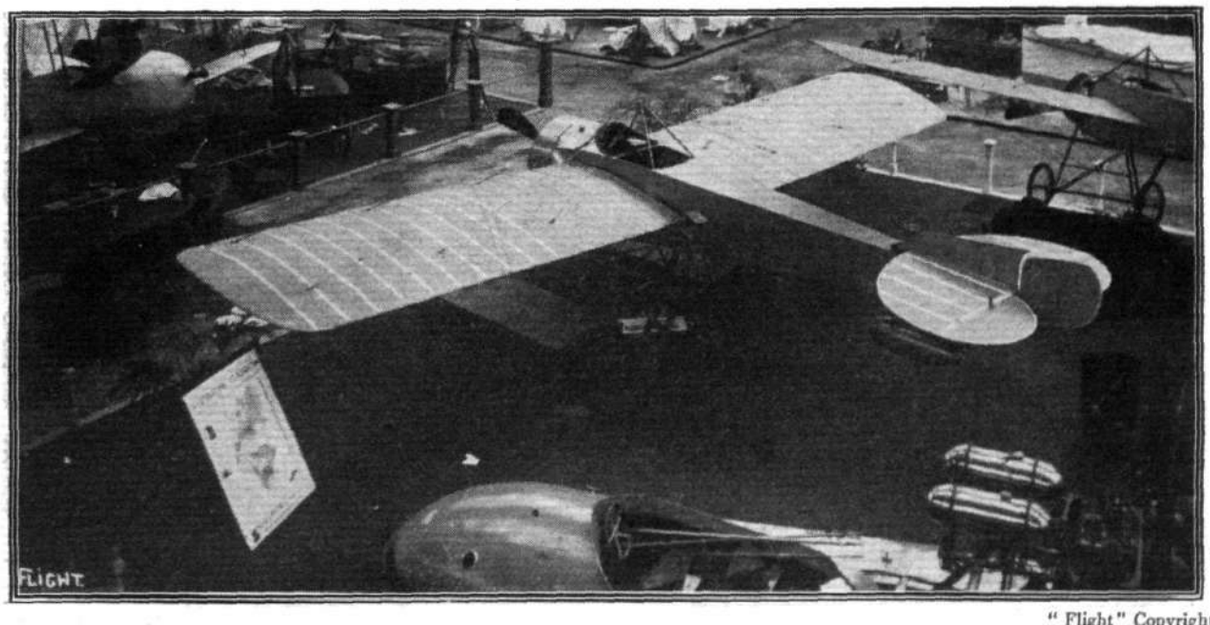
Perry Beadle and Co.'s stand.



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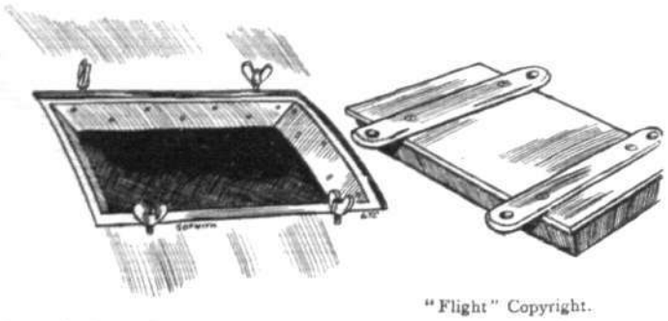
The Nieuport stand.

SOPWITH (THE SOPWITH AVIATION CO., LTD.). (44.)

THE 200 h.p. machine exhibited on this stand is a development of the bat-boat which won the Mortimer Singer prize, and of the later type which has recently been delivered to the Navy. It is one of the finest examples of workmanship at the Show, and is a thoroughly sound piece of work throughout. The boat itself, as well as the machine, was built at the Sopwith works at Kingston.



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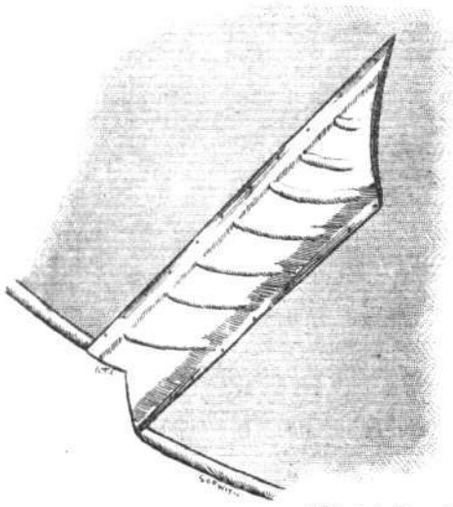
One of the inspection doors in the floats of the Sopwith tractor hydroplane.



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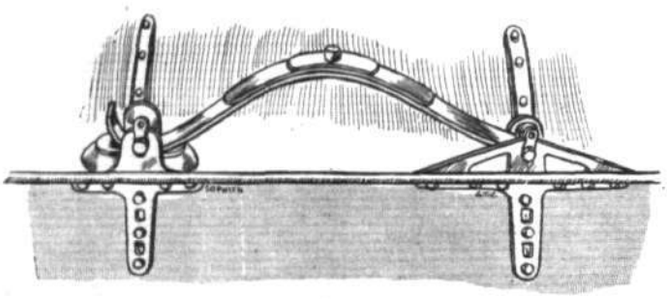
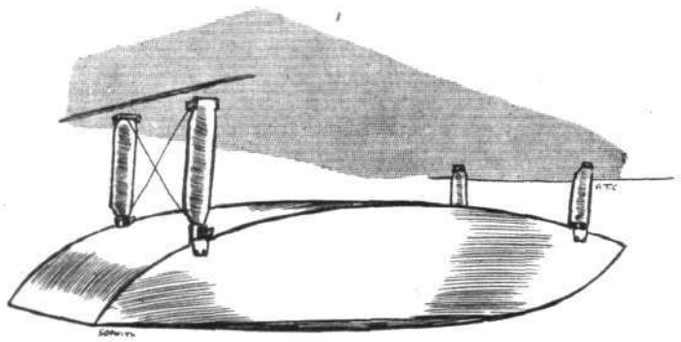
The brass channel which leads air to the step of the Sopwith bat boat.





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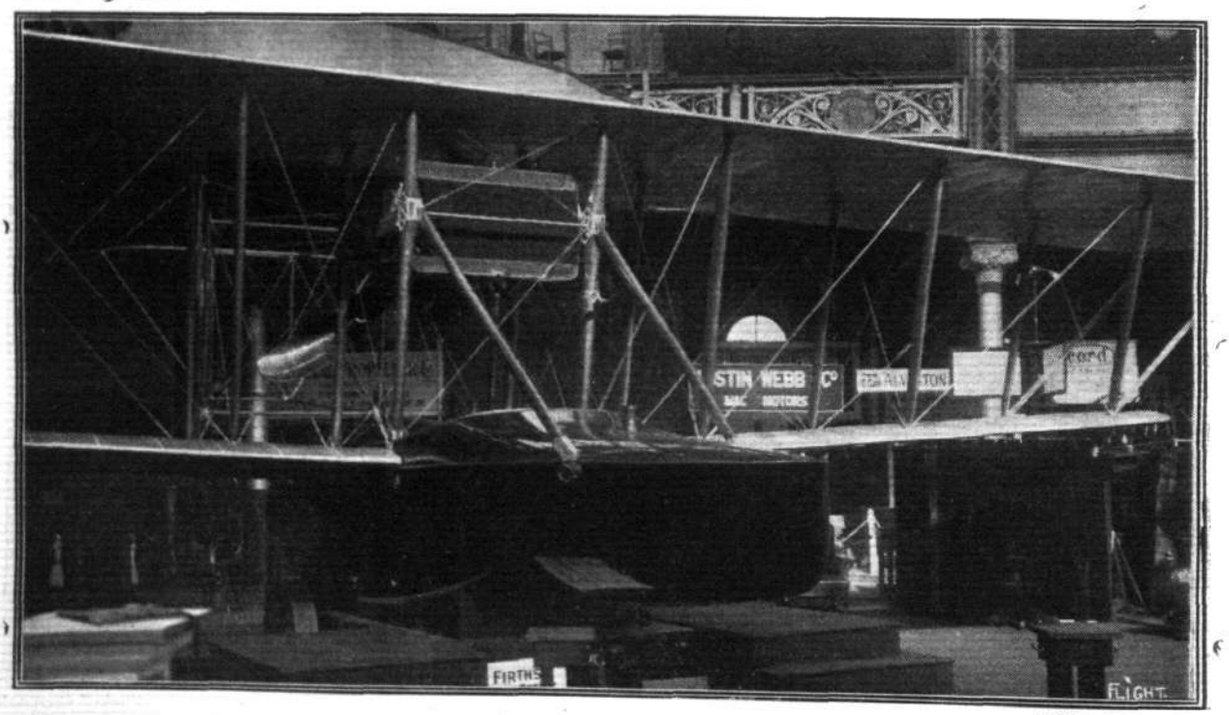
The leaf spring, which provides the springing of the floats, on the Sopwith tractor seaplane, and on right one of the wing tip floats on the Sopwith bat boat.

The boat is built up of two skins of mahogany over ash stringers. It is of the single-stepped type, the hull being of the displacement type in front, gradually flattening out towards the step, where it is perfectly flat. The method of leading air to the step is very ingenious. Instead of doing this by leading tubes through the interior of the boat, which necessitates piercing of the bottom, the



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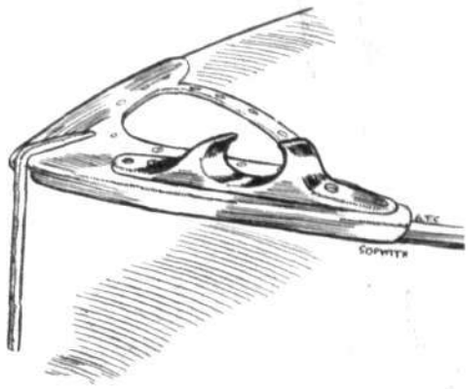
Three-quarter front view of the Sopwith bat boat.

same results have been obtained by sheet brass channels screwed to the sides of the boat, as shown in one of the accompanying sketches.

The engine, a 200 h.p. Salmson, is mounted on pressed steel frames on very thick ash bearers, between the rear inner pair of the plane struts, whilst the radiator is mounted between the two front struts. The inter-plane struts are of ample size, and are all made of spruce, with the exception of the inner two rear struts which carry the engine bearers, and which have therefore been made of ash. The whole structure is further strengthened by two oblique struts running down to the forward portion of the boat.

The pilot's and passenger's seats are arranged side-by-side in an extremely roomy cockpit, the pilot occupying the right-hand seat. Control is by wheel on a single tube for *ailerons* and elevator, whilst the rudder is actuated by a pivoted foot-bar. A very complete set of instruments is mounted on a neat instrument board, in front of the pilot, whilst in the left-hand side of the boat, and in front of the passenger's seat, is mounted the wireless set driven by a motor cycle engine. The main petrol tank, which has a capacity sufficient for four and a half hours' flight, is situated in the boat behind the occupants. Petrol is forced from this tank to a smaller service tank between the engine and the radiator, whence it is fed by gravity to the engine. Under the pilot's and passenger's seats are carried two compressed air self-starters by means of which the engine may be started from the pilot's seat without the necessity of swinging the propeller, a performance which would be extremely difficult, if not actually impossible, on a machine of this type. The four tail booms form a V as seen in plan. These and their struts are made of spruce. The fixed tail plane is flat, and is braced by four steel tubes running from its outer edges to the lower tail boom. The elevator is divided in order to allow of sufficient movement of the rudder, which latter is of the balanced type. There is no vertical tail fin on this machine. It will be noticed that the lower main plane has a very pronounced dihedral angle, in order, no doubt, to allow the machine to roll considerably without fear of the lower planes touching the water, this being further prevented by wing-tip floats of similar construction to that of the boat.

Unfortunately Sopwith's were prevented, by lack of space, from exhibiting more than the one machine, and have had to be content with showing one of the main floats of their tractor hydro. This float is of similar construction, although of a different shape, to that of the boat. The workmanship in this float, as well as in that of the complete machine, is of the very highest quality. The float shown is of the single-step type, and has five watertight compartments, each fitted with a very neat inspection door. These, as will be seen from the accompanying sketch, have bevelled edges, and are screwed down with butterfly nuts, the opening in the deck being rubber faced in order to provide a watertight joint. The combined trolley and turntable on which this machine is mounted greatly



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Streamline snatch-cleat on the bow of the Sopwith bat boat.

facilitates the operation of running the machine from the hangar down to the water and *vice versa*, and would appear to be an absolutely necessary accessory for the easy handling ashore of so heavy a craft as this.

An item in the exhibit on this stand which attracts considerable attention is the actual Green engine used by Mr. Hawker in his waterplane flight round Britain last summer. This engine, it will be remembered, flew 1,043 miles in 55¾ hours, or actual flying time 21 hours and 44 mins., which is claimed to be a world's record.

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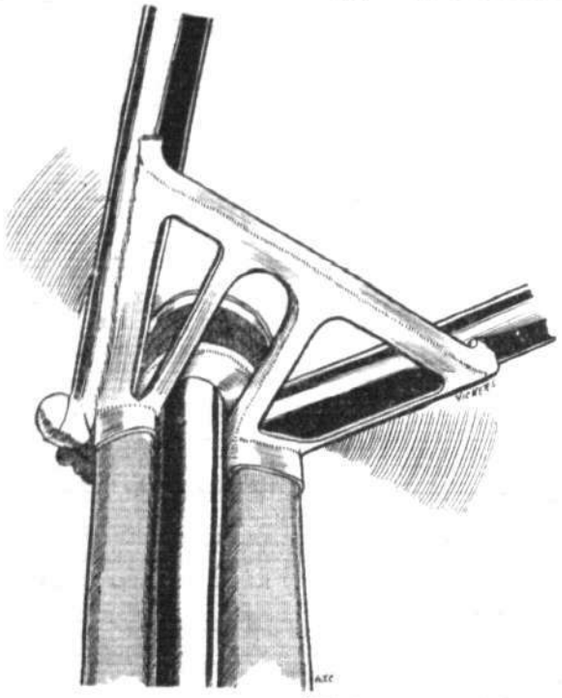
VIEW FROM ABOVE OF THE WIGHT SEAPLANE.—This photograph clearly shows the peculiar double cambered upper surface of the wings.

VICKERS (VICKERS, LTD.). (66.)

TWO machines are exhibited on the Vickers stand—one a 100 h.p. fighting "pusher" biplane, whilst the other is a fast scouting tractor biplane. **The 100 h.p. Fighting Biplane** is of a somewhat similar type to the one exhibited at Olympia last year, with the exception that this machine has not staggered planes. It is driven by a 100 h.p. Gnome *monosoupape* engine, mounted on



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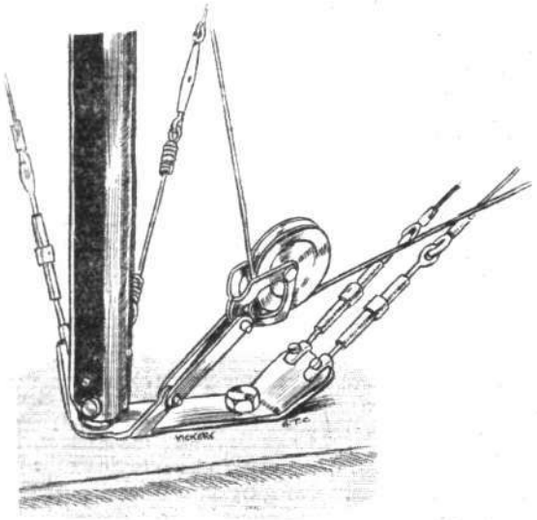
Chassis detail of Vickers tractor.

overhung bearings in the rear of the *nacelle*. The latter structure is made throughout of steel tubes covered with aluminium. In the nose of the *nacelle*, and mounted on a universal joint resting on the tubular framework, is a Vickers Automatic R.C. gun, which has a range of action of 30 degrees in any direction from the line of flight. The gun projects through a circular opening in the nose of the *nacelle*, whilst a hemispherical shield is mounted on and moves with the gun barrel. This shield is fitted with mica windows, through which the gunner obtains his sights. This arrangement enables the gunner to operate the gun without the draught of wind interfering with the sighting of it. The seats, which are of the bucket type, are arranged tandem fashion, the passenger, of course, occupying the front seat. The pilot controls the machine by means of a wheel mounted on a tubular bridge of inverted U-shape. Rotation of the wheel operates the *ailerons*, whilst a to-and-fro movement actuates the elevator. The rudder is worked by a pivoted foot-bar.

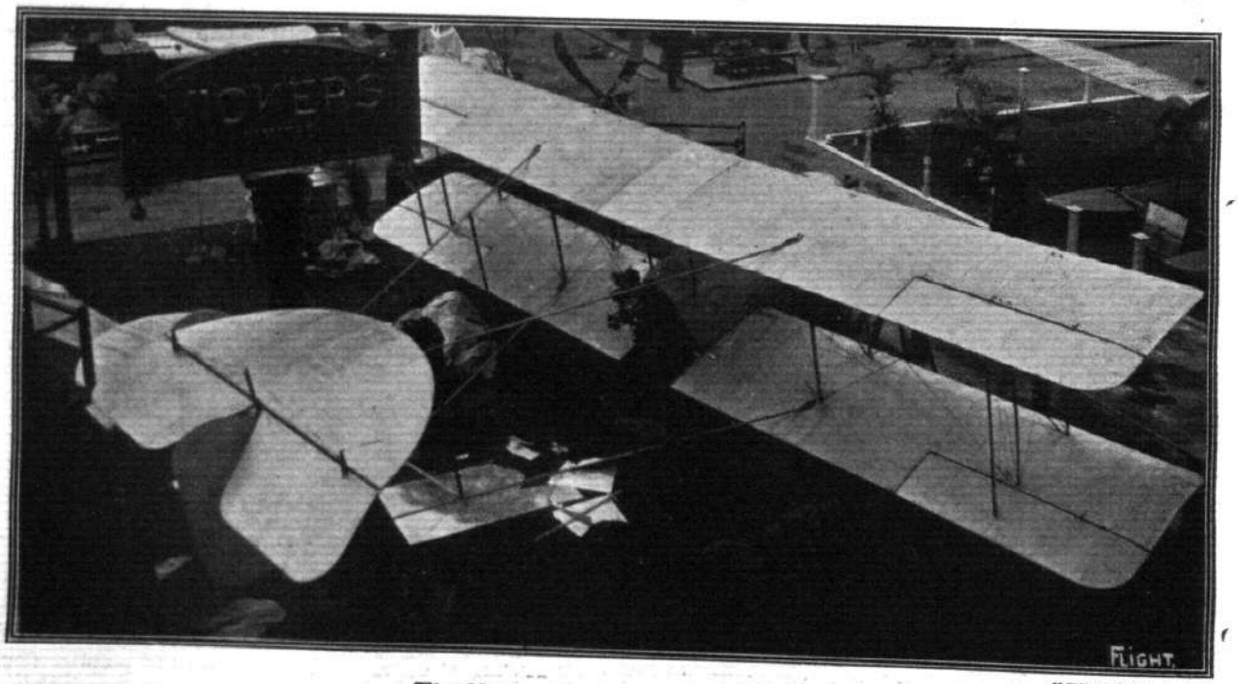
The chassis is of a different type to last year's model. It consists of two ash skids, carried on four streamline steel tube struts. A tubular axle, streamlined with wood, is slung from the skids by rubber cord. This machine is built of steel practically throughout,



"Flight" Copyright.

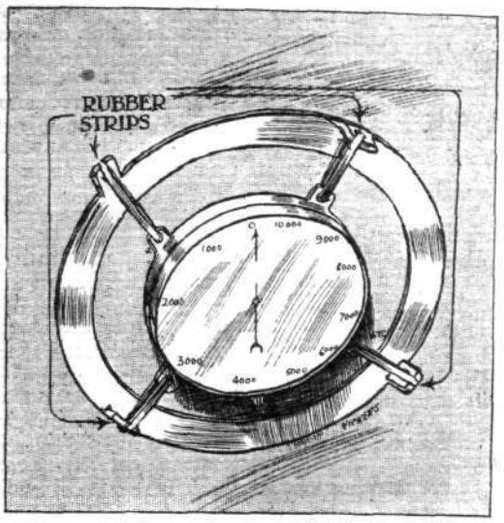
Sketch showing attachment of pulley for *aileron* cable employed on Vickers biplanes.

with the exception of the wings, which have spars of I-section spruce, with ribs built up of three-ply webs and ash flanges. The lower plane is attached to the *nacelle* by fitting the spars into steel tube sockets running right across the *nacelle*. Streamlined steel tube struts separate the main planes, the whole being made rigid by means of stranded cables which are all in duplicate. The angle of incidence is 4½°, and the planes are set at a dihedral angle of 1°.



The Vickers gun-carrying biplane. **"Flight" Copyright.**

The **100 h.p. Tractor Scouting Machine**, similarly to the fighting biplane, is driven by a 100 h.p. Gnome *monosoupape* engine mounted on overhung bearings. This machine, which it is anticipated will prove very fast, is at present fitted with a comparatively small tank, which has a capacity sufficient for two hours' flight only, with pilot and passenger; but another tank, so designed that it can be fitted very quickly, may be carried instead of the passenger, which gives a capacity sufficient for 4½ hours' flight. The *fuselage* of this machine is built up in the usual way of ash *longerons*, and ash and spruce struts and cross-members. The pilot's and passenger's seats are arranged in tandem with the pilot in the rear, and control is by means of a single, central column and a foot-bar. The usual set of instruments is carried on the dashboard in front of the pilot. The tail planes consist of a cambered fixed stabilizing plane, semicircular in plan view, to the trailing edge of which is hinged a divided elevator. The rudder is balanced, and no vertical tail fin is fitted. A tail skid sprung by rubber shock-absorbers inside the *fuselage* protects the tail planes against contact with the ground.



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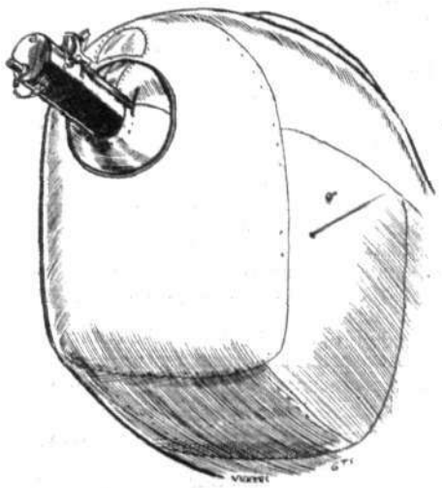
Mounting of altimeter on Vickers tractor.



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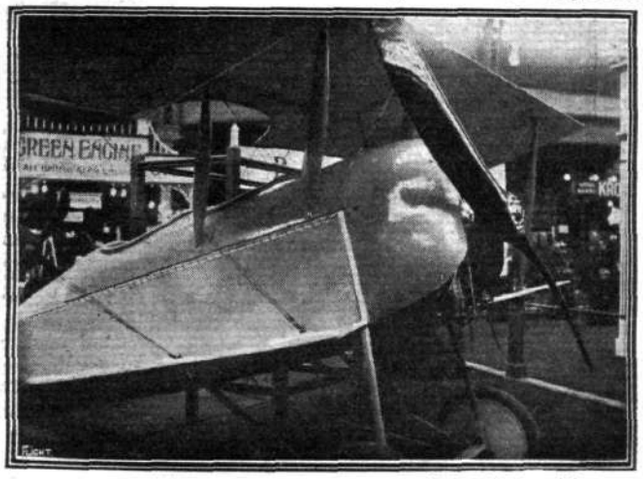
Nose of Vickers gun-carrying biplane.

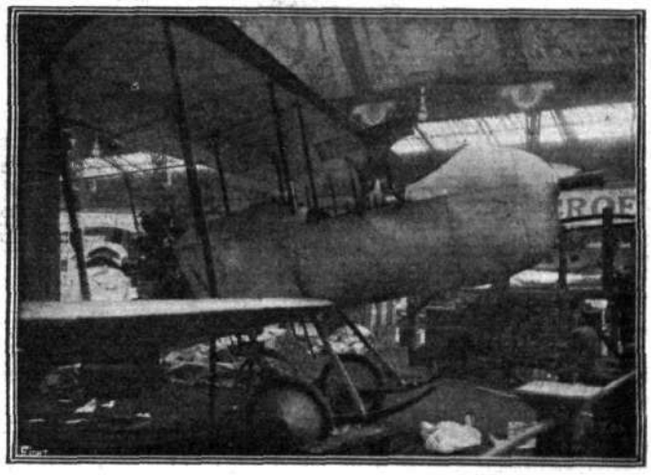


"Flight" Copyright.

The Vickers tractor biplane.

The chassis is of a very simple type, consisting of two pairs of V streamlined steel tube struts. In the V between the struts is carried the tubular axle, which is sprung by means of rubber cord. The angle of incidence on this machine is only 3°, and as the planes are absolutely flat on their lower surface, it should prove very fast indeed. The main planes are set at a slight dihedral angle, 1° to be exact.

In addition to the two complete machines, there are shown on this stand several examples of the Vickers-Levasseur propellers in various stages of construction.



"Flight" Copyright.

Nacelle and chassis of Vickers gun-carrying biplane.

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The Round-the-World Flight.

SINCE it was first proposed, the scheme for a flight round the world in connection with the Panama-Pacific Exposition has undergone some revision. The maximum time allowed has been extended to 120 days, and competitors who do not wish to fly across the Atlantic may ship their machines on steamers, but pilots taking advantage of this condition will be heavily penalised, while any competitor actually flying across the Atlantic will be given a large credit for this feature in the distribution of prizes.

A Night Trip by Maurice Farman.

ON one of the latest M. Farman biplanes, fitted with a silenced motor, Maurice Farman, on Wednesday evening last week, started off from Buc at 8.30 p.m. and flew over Satlay, Jouy-en-Josas, Villacoublay, Petit-Bicetre, Chatillon, Chalais-Meudon, Velizy and Satory Camp. At the last mentioned place, searchlight practice was in progress and the biplane was located by three searchlights. Flying over St. Cyr, Toussus-le-Noble the return trip was made to Buc, where a safe landing was effected at 9.15 p.m.

Salmson Engines for Sikorsky Machine.

AT the French Salmson works, two 200 h.p. motors of the Canton-Unné type have just been completed to the order of the Russian constructor Sikorsky, for use on one of his giant biplanes.

Another Scare at Luneville.

CONSIDERABLE excitement was aroused in Luneville on the 12th inst. by the announcement that a strange aeroplane had been seen flying over the forts during a snowstorm. The sentinel who saw the machine said it made a sudden dive over the Mondon forest, but a search there failed to reveal anything. Enquiries of the German military authorities showed that no German officer had flown over the frontier, and it was subsequently discovered that the machine was from the French military station at Epinal. It is stated that the pilot, Corporal Madon, and his passenger have been punished by the military authorities.

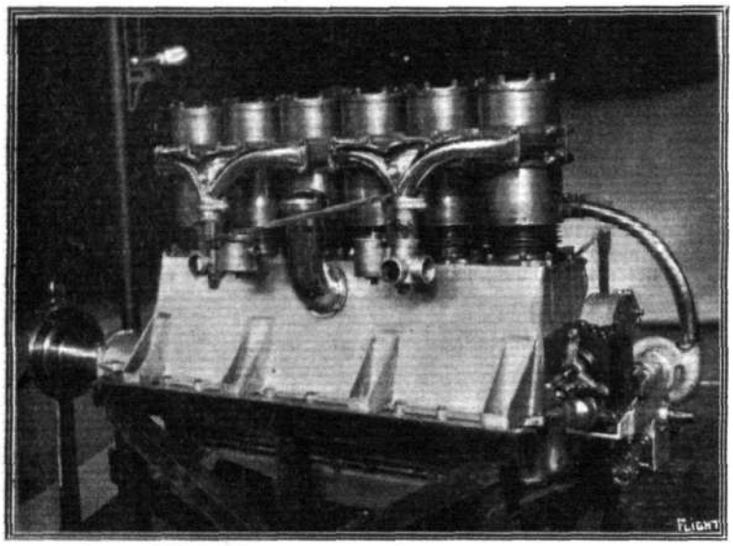
SOME MORE ENGINES AT OLYMPIA.

Argylls, Ltd. (STAND 33.)

THE aero engines shown on this stand resemble, in some measure, the conventional car engine, being of the 6-cylinder vertical type, but the cylinders are separate and of forged steel, while the magneto and water-pump driving shaft is disposed at the end of the engine. The detachable heads employed on the ordinary sleeve-valve engine are fitted, and are of steel, as are also the jackets on the cylinders.

Water cooling, by forced circulation, is provided, but radiating fins have been turned upon the circumference of the lower portion of the cylinder barrel to assist in keeping down the temperature at that part. Particular attention is directed to the ingenious method of attaching the inlet and exhaust connections. These are formed in two halves, and held together so as to encircle the cylinder in the vicinity of the ports, by a special form of clamp—the two halves being pinned to the cylinder so as to prevent any up or down movement.

The crank-case is of cast aluminium, the lower portion forming an oil sump, from whence oil is drawn by two gear pumps driven off the end of the crank-shaft, and fed to the main bearings and the



120 h.p. sleeve-valve Argyll aero engine.

troughs under the connecting rods and to the valve operating gear A Bosch double ignition set is provided, giving synchronous ignition at two plugs in each cylinder, while two carburettors of the Zenith pattern are also fitted.

It is stated that the engine exhibited, which has just completed its tests at the works of Messrs. Argylls, at Alexandria, will develop 130 h.p. at 1,200 revolutions per minute, so that the weight per h.p. is 4·6. The price of the engine is £1,050.

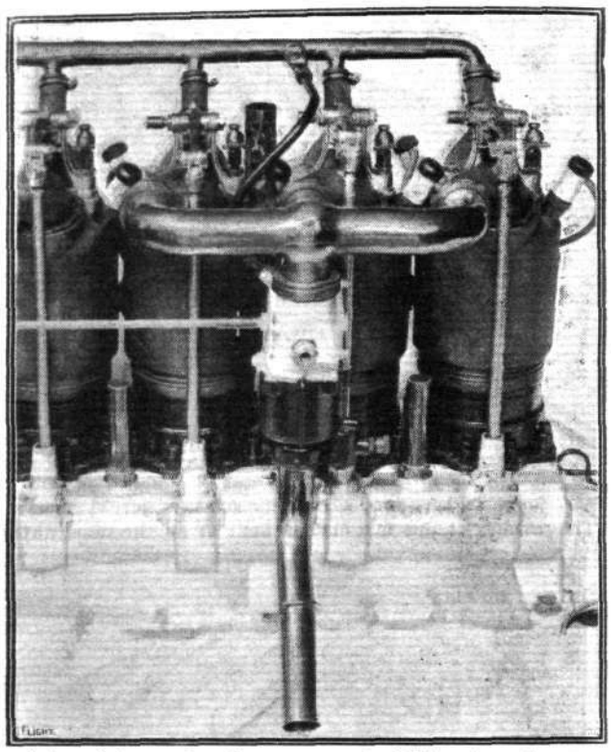
Austro-Daimler Motor Co., Ltd. (STAND 87.)

THE principal alterations carried out in their engines were noted in the last issue of FLIGHT, and apart from detail improvements are mainly in connection with the carburettor, the lubricating and ignition systems and the construction of the lower portion of the cylinders. All these have as their object, the attainment of greater reliability, durability and freedom from breakdown, and as such are deemed to be worthy of commendation. The means whereby immunity from danger through the carburettor, which is of the "jet-in-tube" type with annular float surrounding the jet chamber' catching fire is shown in the accompanying illustration—where the long intake tube and the gauze covered extra-air inlet are clearly seen. This photograph also indicates the holding-down flanges on the cylinder, as well as the grease cups on the valve rocker pivots and the porcelain insulators and protectors the over plugs. The special care taken with the engine lubrication, is evidenced by the fact that each cylinder is provided with a special oil feed through a small ball valve from the main forced system, thereby ensuring the minimum of friction in a part where effective lubrication is extremely difficult; while the comparative freedom from attention is demonstrated by the statement that one of the 120 h.p. engines was used by the late S. F. Cody for twelve months without being overhauled.

An exceptionally short connecting rod is employed, its length being only 3·2 times the crank throw, but the obliquity on the power stroke is reduced by setting the cylinder *desaxé* with respect to the crank-shaft. It will be seen that the water pipes are of gradually increasing bore, so as to ensure the supply of an equal quantity of water to each cylinder.

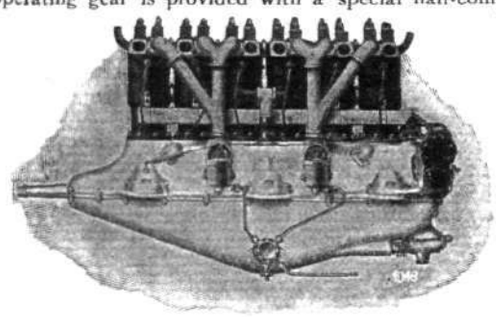
Benz (The Brompton Motor Co.) (STAND 26.)

THE 85 h.p. engine shown on this stand is quite up to the standard of excellence now expected with the Benz products. Every attention has been given to the elimination of distortion and vibration due to structural weakness, lack of rigidity or imperfect balance, with the result that the engine runs extremely smoothly at all speeds and under the heaviest load.



Inlet piping and carburettor on the 90 h.p. Beardmore Austro-Daimler engines, showing the precautions taken against fire.

Lightness has been achieved by the employment of the highest grades of materials and the extensive use of webbing and ribbing, especially in the crank-case, which is a fine piece of work in aluminium, a nose piece extending from one end in which a ball thrust for taking the propeller thrust or push is supported. The valve operating gear is provided with a special half-compression



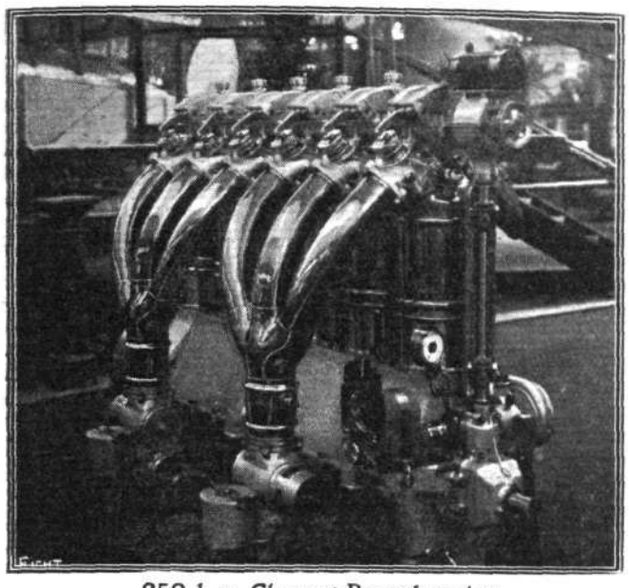
85 h.p. Benz aero engine, as viewed from the inlet side.

device, so as to facilitate starting up. All the aero engines produced by this firm have two magnetos with two sets of plugs, concerning which we need only say that apart from any question of increased power, the greater surety that the engine will function, even when one set of plugs become fouled, renders the practice an extremely desirable one.

Clement-Bayard (Delacombe and Marechal.) (STAND 67.)

THIS engine has attracted considerable attention because of its large size and the workmanship displayed in its manufacture. It is rated at 250 h.p., 155 mm. bore by 200 mm. stroke, but has developed 280 h.p. at 1,400 revs. per minute, and is intended for airship and hydro-aeroplane. An overhead valve gear is fitted, driven by a vertical shaft, provided with universal joints at each end, which are totally enclosed by an aluminium casing so as to

exclude dust and moisture. The valves are operated by rocking levers that have a novel form of adjustment. Instead of the usual screw in the end of the lever over the valve, the lever is made in two parts, one of which engages with the cams and the other operates



250 h.p. Clement-Bayard engine.

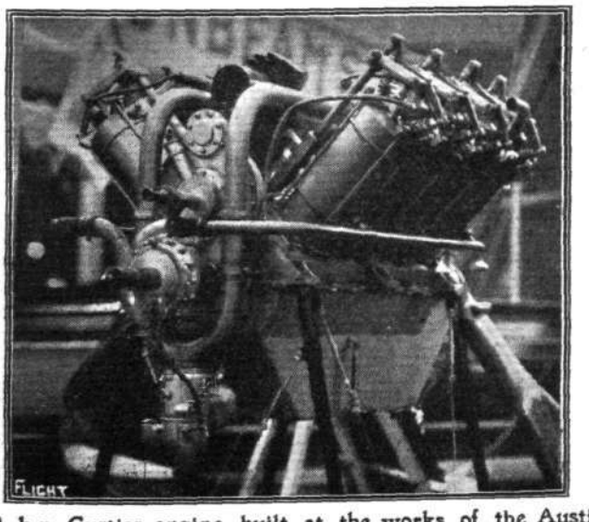
the valves. These two pieces are mounted on a pin supported in a bracket from the cylinder head, the faces of the bosses looking towards each other being provided with serrations which engage with similarly serrated surfaces on a hardened steel washer. Thus, to effect adjustments the two halves are moved round by one or more serrations in either direction, the angular movement bringing the lever closer up to or away from the stem of the valve.

The inlet water pipes on the engine are formed integral with the copper jacket, the various cylinders being connected up by means of long rubber pipe joints. A special method for regulating the oil supply to the engine is fitted, and the half-compression mechanism for enabling easy starting to be obtained is mounted on the valve rockers. As is now customary on large engines, a Bosch electrical starter is provided.

Curtiss (Austin Motor Co.). (STAND 52.)

AS announced in FLIGHT last week, Messrs. Austin Motor Co. have undertaken the manufacture of the two 100 h.p. Curtiss engines which will be fitted to the Curtiss flying boat entered by Messrs. White and Thompson, of Bognor, for the Circuit of Britain Race this year. One of these engines, to which is fitted a Pemberton Billing 3-bladed propeller, is shown on the Austin stand.

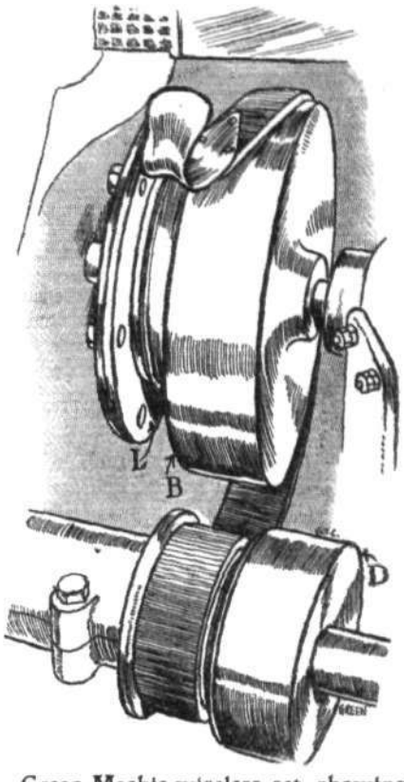
The engine is an 8-cylinder of the water-cooled vee type, having a bore and stroke of 4 and 5 ins. respectively, and a weight of 320 lbs. It develops its rated horse-power at approximately 1,700 revs. per min., and 106 B.H.P. at 1,800 revs. per min. The cylinders are each attached to the crank-case by 8 short studs, and 4 long columns, the latter reaching up the sides of the cylinder to a bridge



100 h.p. Curtiss engine, built at the works of the Austin Motor Co. for the 1914 Circuit of Britain.

or yoke fitted over the heads, while the valve guides and seats, which are placed in the cylinder heads are cast integral with the cylinder—thereby giving an almost hemispherical shape to the combustion chamber. The valves, of cast-iron with electro-welded steel stems, are operated by rocking levers and push-rods from a camshaft in the crank-case between the cylinders, the exhaust push-rods being inside the tubes for actuating the inlet valves. Jackets are made from a non-corrosive metal, welded to the cylinder barrel by the oxy-acetylene process, and the whole of the cylinder and jacket is plated with nickel—a practice that finds favour with several American manufacturers, owing to the better protection afforded against atmospheric influences.

The lower half of the crank-case is divided into four parts, and serves as a reservoir for sufficient oil to last for a six hours' continuous flight. The lubrication is effected by a pump-feed through the interior of the crank-shaft and the cam-shaft to all bearings, of which there are five main and four crank-pin bearings, the gear pump being driven by bevel gearing from a wheel formed integral with the crank-shaft. Forced water circulation is employed, and is supplied by a centrifugal pump placed on crank-shaft, the latter being continued so as to form a starting gear at the end. The general appearance of the engine can be seen from the accompanying illustration. A Schebler carburettor is fitted, and the magneto is driven by gearing from the valve timing gears.

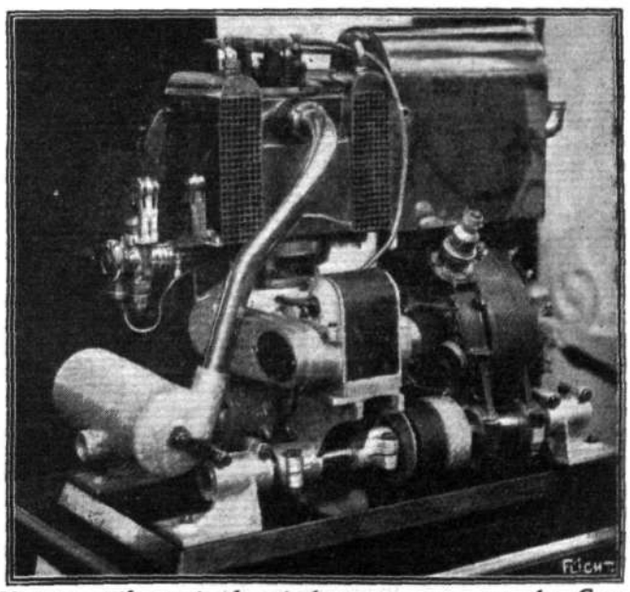


Green-Mackie wireless set, showing the coupling between the engine and the dynamo and the starting arrangement.

This design has received a considerable amount of support in the United States, and, having in mind the reputation possessed by the Austin Motor Co., it need hardly be said that it is unlikely there will be any fault to find in the workmanship displayed in the manufacture.

Green Engine Co. (STAND 85.)

THAT every effort is made to ensure the satisfactory performance of their engines is clearly demonstrated by the exhibit on



2¾ h.p. self-contained wireless set, seen on the Green Engine Co.'s stand.

this stand, where the 120 h.p. engine entered by the Green Engine Co. for the Military Aeroplane Engine Competition is mounted on a tilting test bed, together with a Heenan and Froude dynamometer. It is around this that interest will principally centre, but the parts of a dismantled engine are well worthy of examination.

On the same stand is the Green-Mackie wireless set shown in the accompanying illustration, in which a 2¾ h.p. Green engine is seen coupled to a Mackie alternator. The engine is of similar design to that used for many years on motor cycles and is self-contained, that is to say, the combined radiator-jacket are integral parts of the engine, an additional tank for increased supply of water being fitted over the dynamo. An Amac carburettor and Bosch magneto are used. Particular attention is directed to the coupling between the engine and the generator, and to the method of starting up. As regards the former, a flexible leather disc coupling, L, is employed, the disc being secured to the flange on the crank-shaft at its periphery and to the dynamo shaft, nearer the centre. For starting the engine a pulley, B, is secured to the dynamo shaft, and a spring-controlled leather belt, D, is mounted upon one of the trunnions supporting the unit. To start the engine, the belt is threaded round the pulley and jerked smartly—should the engine fail to start, any number of attempts can be made in rapid succession by alternately pulling on and releasing the belting, which is provided with a handle at the end.

The Isaacson Engine Co. (STAND 70.)

THE 18-cylinder 200 h.p. Isaacson Engine shown on the Eastbourne Aviation Co.'s stand is worthy of close examination, since it is the result of a large number of years of patient development.

The model exhibited is of the rotary air-cooled type, the cylinders, 120 by 150 mm., being grouped in two sets of nine around the steel crank-case, which is supported at both the front and the rear on ball-bearings. A special point of interest is that starting holes are drilled in the flanges of the end-plates to the crank-case, so that by inserting grub screws these plates may be readily removed without damaging the metal, which the use of steel wedges for this purpose might cause. The cylinders are screwed at the inner extremity with a tapered thread, which fits in and is locked by the two halves of the crank-case, which are bolted together. The automatic inlet valves are placed in the piston, and balanced for centrifugal force, whiist the exhaust valves in the cylinder heads are operated through push rods and rocking levers. The helical springs used for closing the latter are not directly attached to the valve itself, but disposed between the end of the rocker and the crank-case. All the valve operating gear is at the propeller end of the crank-case, and is so assembled that it can be withdrawn as one complete unit, so that the engine can be dismantled without disturbing the valve timing. Two Bosch magnetos are fitted and the carburettor—of a special float-feed type—supplies the cylinders through the crank-case, *via* the hollow crank-shaft. The lubricating pump discharges through three separate leads, one of which is taken to the timing gear, and the other two to the two sets of cylinders. A Bosch easy-starter is fitted together with a special contact breaker, so arranged that when using the coil and accumulator, as at starting, the spark occurs about 2 or 3 mm. past the dead centre, thereby preventing any possibility of back fire. The engine exhibited develops its rated horse-power at a speed of 1,200 revs. per min., and its weight is 465 lbs.

This firm also manufactures three other models of a similar type, as well as radial engines, the number of cylinders being severn, nine and fourteen. A 60 h.p. motor fitted to a Flanders biplane has been doing continuous service for some months past at Brooklands aerodrome, as recorded regularly in recent issues of FLIGHT.

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THE INAUGURAL LUNCHEON AT OLYMPIA.

SIMULTANEOUSLY with the opening of the doors of Olympia to the public for the Aero Show, after the King had made his minute inspection of the Exhibition, a Press Luncheon was held. Mr. S. F. Edge, President of the Society of Motor Manufacturers and Traders, under whose auspices, combined with the Royal Aero Club, the Exhibition is held, presided, supported by Mr. J. E. Hutton, Chairman of the Aero Committee of the Society, and Mr. J. Maughfling, Chairman of the Marine Section, and a representative company, including the following:—Admiral Sir W. R. Kennedy, G.C.B., Maj.-General R. M. Ruck, C.B., R.E., Col. H. C. L. Holden, C.B., F.R.S., Maj.-General H. T. Arbuthnot, C.B., Sir J. I. Thornycroft, LL.D., F.R.S., Mervyn O'Gorman, M.I.Mech.E., Major J. D. B. Fulton, C.B., R.F.A., Dr. R. T. Glazebrook, C.B., F.R.S., Engineer-Commander H. S. Garwood, R.N., F. P. Armstrong, Commander C. R. Samson, R.N., F. W. Lanchester, Col. H. S. Massy, R. T. Gates, Max Worms, T. C. Pullinger, F. W. Shorland, A. Picard, Basil H. Joy, C. Marston, Howard Wright, Capt. J. Sealy Clarke, S. Straker, W. M. Letts, J. S. Stafford, H. A. Blackie, T. O. M. Sopwith, C. Grahame-White, F. R. Simms, H. E. Perrin, Warwick Wright, G. Holt Thomas, Capt. H. T. Wood, T. Thornycroft, E. Manville, M.I.E.E., J. E. Thornycroft, Bertram G. Cooper, P. Grace, A. McCormack, J. S. Matthew, E. M. C. Instone, Stanley Spooner, H. M. Hobson, F. May, G. Green, Lieut.-Col. A. F. Mulliner, J.P., V.D., J. Cates, H. White Smith, G. Stanley White, F. F. Thursfan, H. J. Thomas.

The first toast, "British Aviation," was in the hands of the Marquess of Tullibardine, who, after thanking the Society through the Chairman for all the good they had done for the development of the aviation industry, gave a brief *résumé* of the evolution of flying, and pointed out the great gain shows of the Olympia description were as educational factors. He said that we heard a good deal about the degeneracy of the race, but we need not despair so long as we had men of the calibre of the British pilot—men ready to take their lives in their hands in the defence of their country, men who, as soon as a comrade fell, came forward cheerfully to take his place, men determined that Britain should not fall behind in the race for air supremacy. Neither should we forget, he continued, in connection with the sacrifices which had been made, the magnificent examples set by the mothers and relatives of those whose lives were lost for so magnificent a cause, referring specially to a case in which, in the hour of her great loss a message was sent to the nation by a noble lady urging others to continue to do their duty without a falter.

The response was in the hands of Brigadier-General Henderson and Capt. G. M. Paine.

General Henderson said he desired to explain that the absence of Col. Sykes, Commandant of the Military Wing of the Royal Flying Corps, and of other officers of that Corps, was due to the fact that they were at the moment paying a last tribute to two of their comrades whose lives had been lost in the performance of their duty. Continuing, he said that the practical employment of aviation in these islands was for the present largely confined to the Naval and Military services, but he felt that the science of aerial navigation must have other phases of utility apart from those highly specialised ones. The first duty of those concerned with Government aeronautics was the defence of this nation. The current Exhibition revealed an enormous advance made in British aviation. From time to time they made attempts to put forward certain of the requirements of the Naval and Military services. There had been misinterpretation, however, on some of those occasions. For example, if a degree of required performance was indicated, it did not mean that that performance was the whole of what they wanted. On the contrary, such a specification of requirements meant that no machine which could not fulfil those minimum conditions would be of any practical use for whatever purpose was in question. This applied also in regard to engines. They did not mind what degree of merit beyond that specified any individual manufacturer cared to reveal by his product; the higher the better. It was very difficult for them, however, to judge by specifications the precise degree of suitability of any given flying machine for war service. The only proof of utility came from the practice of the members of the Royal Flying Corps on whatever machines were in question. They must remember, moreover, that they could not separate aeroplane and engine, since the one was of no use without the other. He submitted that there was an enormous advance in the science of designing aircraft, also that it had not yet been proved that the advance in connection with the production of aerial motors had been equal to that achieved in regard to aeroplanes. He thought, however, there was every prospect that before long they would have the engines they wanted produced in this country, and, he hoped, designed here. Let it be borne in mind that they did not want a record-breaking motor that could do 14 or 24 hours' run without a rest. They wanted manufacturers who could produce whole series of engines, each of which could be relied on always to fly, say, for three hours at a spell.

Anyone who took up in the proper spirit this proposition would, he was satisfied, find it a very profitable field indeed. He did not think there had been such a degree of advance during the past year as far as aeroplanes were concerned in any country equivalent to that in this country, whilst all the time they had been watching very carefully other countries which had taken up the science seriously. We could now, he said, not only equal, for our particular service purposes, anything that could be made abroad, but we were able to surpass all that had been produced elsewhere, and he congratulated the constructors to whose genius such a position was entirely due upon the soundness of their designs.

Capt. Paine said that enormous strides had been made since last year, but it must be remembered that aviation was still in its infancy. So many people expected to get absolute perfection in

about nine minutes. That was impossible. He thought that the good pilot of to-day was in advance of the material he had to fly. He did not want the automatic stability so much as good steerability and controllability. All looked forward to the advance of the reliable British engine, which was, he thought, more important in seaplanes than in land machines, by reason of the difference in the problem of forced alighting. Sad as the recent accidents were, he was glad to know the ardour and zeal of those engaged in the work were in no way damped by these disasters in pushing forward the great new science of aviation. Since last year, the strides made were enormous in the quantity and quality of pilots, naval, military, and civilian.

Mr. W. Joynson-Hicks, M.P., proposed the toast of "The Exhibition." It was a healthy sign that British constructors were taking seriously the manufacture of aero engines, and he looked forward to the time of great development in the large passenger-carrying machines. An indication of what might be accomplished in the future might be gathered from a remarkable feat which was recently performed on an Avro machine, which was able to glide over a distance equal to crossing the Channel, and that without once using the engine. The future use of aircraft would not be confined, he thought, merely to the science of warfare, though we must fully realise that by the great change which had been brought about in that connection by the advance in aviation that Britain must be a sky power side by side with her sea power. It was difficult to put a limit to the science of aviation. We were but at the commencement; just about where the Ancient Britain started with his coracle of old. The advance had been great, but he foresaw that within the next five years, in 1919, such improvements that those there that day would wonder how we had regarded seriously the productions of 1914.

Mr. S. F. Edge, in acknowledging the toast, mentioned the great help King George had given to the science by his visit that morning, showing the keen interest that was taken in this industry. The King's visit was not merely a formal visit; he was intensely interested, and asked many leading questions begotten of his naval experience. At the moment not only was aviation a hazardous science, it was besides a hazardous commercial undertaking. To-day there was practically no business in catering for the private user, whose patronage gave the motor car maker his start, probably because the individual buyer was not able to compare notes with his fellows, and therefore assumed he was exceptional in the troubles he experienced. He suggested that it would be as well for the Government not to be too exacting in its demands of the industry at the moment; but to think kindly of triers, since it was of vital importance that manufacturers of promise should be enabled to give continuous employment to skilled workers. It was not necessarily the firm with immense resources behind it which was alone worth retaining in the industry. It was a mistake, he thought, not to allow members of the Royal Flying Corps to take part in private and open competitions. They should be granted this permission, as it would be an inducement to the development of the sport among private individuals, who would strive to excel and thereby would not only create a new class of patron of the industry, but would help to the supply of a splendid number of pilots of the right sort. In regard to engines, it was hardly enough that the Government should merely say, here are a number of tests through which we are prepared to put your production. They should rather encourage the inventor and young firms who required such support to enable them to go forward and produce something still better. Until the general public took a hand in the support, this should be a necessity. In motor cars it was the amateur who had taken this place, and had enabled manufacturers to advance. He stated that pilots should be mechanics as well as merely flyers, as the pilot should know as much as the man who stayed on the ground, so that he was readily able to distinguish the first sign of trouble, and thereby anticipate any source of coming danger. He thought by such training many lives would be saved. In promoting the Exhibition the Society was not actuated by motives of gain. On the contrary it was deliberately spending, not making, money, for its sole purpose was to help aeronautics. He would like to see some Government exhibits, as he thought that might help him to bring the public to Olympia in greater numbers. He was sorry to observe that the prohibition of flying over certain areas, such as Southampton Water, was discouraging to the development of the native industry in that such centres offered peculiar facilities for the establishment of works for the production of aircraft; but in the circumstances it was impossible to embark on enterprises of that sort. It was good news that he had heard to-day that, after an interval of time, Britain had now put forward three challengers to compete on behalf of this country in the Gordon-Bennett Aviation Race. He was sure it would help manufacturers greatly in this country if we could again win this Trophy, as it would draw attention to the splendid work in Great Britain, and as a natural consequence draw orders from all parts of the world for our constructors.

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Engines for the Royal Flying Corps.

IN answer to a question on the subject of water-cooled engines, put by Mr. Joynson-Hicks in the House of Commons on the 11th inst., Col. Seely said: "One is in actual use, and 24 others are being fitted into the 24 aeroplanes under construction at the Royal Aircraft Factory. I have no information as to the number in use in the German Flying Corps, or as to the results obtained, but the high standard of reliability of the engine in question is recognised."

Mr. Hucks at Northampton.

ON Thursday, Friday and Saturday, March 26th, 27th and 28th, Mr. B. C. Hucks will give demonstrations of looping-the-loop and upside-down flying at Delapre, Abbey Park, London Road, Northampton, commencing at 3 p.m. each day.

Opening of Brooklands Season.

THE motor car racing season at Brooklands opens with the race meeting on Easter Monday, which this year falls on April 13th, and as usual the programme will include an aeroplane handicap. Details as to the event will be announced later, but the prizes will be £50, £25, and £10.

A Dunne Machine at Farnborough.

SEVERAL test flights were made at Farnborough on Wednesday of last week with a Dunne biplane, piloted by Mr. Percival. After solo flights lasting 20 mins. and half an hour respectively Mr. Percival took up a passenger for a quarter of an hour, the machine during this trip getting to a height of 3,000 feet.

British Attempt for Transatlantic Prize.

THERE is a possibility of an Avro machine being built with a view to competing for the *Daily Mail* Transatlantic prize, as we understand that Messrs. A. V. Roe and Co., in response to some enquiries, have gone carefully into the matter and are prepared to build a suitable machine. Should the proposal materialise, the machine will be designed to carry three men, and to fly during the initial stages of the trip at a speed of 70 miles an hour.

Seaplanes with Folding Wings.

WHEN describing Messrs. Short Brothers' new works at Rochester recently it was mentioned that the size of the doors was considered ample for all purposes "having regard to the firm's present development in aeroplane construction." At that time we were not at liberty to give the reason for this statement, but it is now announced that Messrs. Short Brothers have developed a method of folding the wings of waterplanes, by means of which the overall width is reduced to about 10 feet. This is effected in an extremely simple manner, by rotating the wings on each side in a horizontal plane, so that they lie parallel to and at the side of the *fuselage* of the machine, and may be readily accomplished in a few minutes while the machine is on the water. The advantages of these systems, especially for machines which have to be housed on a ship, are obvious.

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To Assist Aeronautic Students.

A THOROUGH inquiry is now being made by the Aeronautical Society into the possibility of organising the Students' Section of the Society, which now numbers twenty-two, into groups of local associations on the lines of those of other technical societies. A proposed Students' Prize Fund is under consideration, and means are also being considered for associating with the Society provincial groups having scientific aims.

Aeronautics and Meteorology.

ARISING out of a suggestion made during the meeting of the Aeronautical Society on January 7th last, to which members of the Royal Meteorological Society were invited, arrangements are now being considered for the formation of a joint committee of the two societies, having as its primary objects the utilisation by each society of the special knowledge of the other for the advancement of both sciences. Joint meetings of the two bodies will, it is hoped, become part of the annual session.

"The World of Aviation"

IS the title given to the new and complete catalogue issued by the General Aviation Contractors, Ltd., in connection with the specialities sold by that concern and its allied companies, the British Emaillite Co., Ltd., and the British Anzani Engine Co., Ltd., &c. The book is a most comprehensive one, and all who have to do with the practical side of aviation should make a point of getting a copy and then see that it is kept handy for reference. It is impossible to enumerate all the things which are listed, but among them are "Emaillite," Anzani motors, "Rapid" and "Regy" propellers, "G.A.C." Spencer-Moulton aeroplane tyres, "Gnomol" castor oil, Roold and "G.A.C." clothing equipment, Hue aeronautical instruments, &c.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

INTERNATIONAL AERO SHOW.

The International Aero, Motor Boat, Marine and Stationary Engine Exhibition, organised by the Society of Motor Manufacturers and Traders, supported by the Royal Aero Club, will be held at Olympia from Monday, March 16th, to Wednesday, March 25th, 1914.

Members of the Royal Aero Club are admitted free on presentation of their membership cards.

A room in the Princes Gallery will be placed at the disposal of the Members during the Exhibition.

An invitation has been extended by the Royal Aero Club to the Non-Commissioned Officers and Men attached to the Naval and Military Wings of the Royal Flying Corps to visit the Exhibition on Saturday, the 21st inst. This invitation has been accepted by the War Office and the Lords Commissioners of the Admiralty on behalf of 40 Non-Commissioned Officers and Men of the Military Wing and 40 Petty Officers and Men of the Naval Wing. During the visit the men will be entertained to luncheon by the Royal Aero Club.

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Tuesday, March 24th, 1914, at 4 o'clock, at 166, Piccadilly, London, W.

AGENDA.

1. To elect the President, Vice-President, and Council for the ensuing year.

The following are recommended by the Committee for election :—

Hon. President:

His Grace the Duke of Argyll, P.C., K.G., K.T., G.C.M.G., G.C.V.O.

Vice-Presidents:

Field-Marshal The Rt. Hon. Earl Roberts, K.G., K.P., V.C., G.C.B., O.M., G.C.S.I., G.C.I.E.
The Rt. Hon. Lord Northcliffe.

Council:

S.A.I. Prince Roland Bonaparte (*President F.A.I.*).
H.S.H. Prince Blucher von Wahlstatt.
The Rt. Hon. The Earl of Hardwicke.
The Rt. Hon. The Earl of Lonsdale.
The Rt. Hon. Lord Howard de Walden.
The Rt. Hon. Lord Kinnaird, F.R.G.S.
The Rt. Hon. Lord Suffield, P.C., G.C.V.O., K.C.B.
The Rt. Hon. Lord Montagu of Beaulieu.
Admiral of the Fleet the Rt. Hon. Sir Edward Seymour, P.C., G.C.B., O.M., G.C.V.O.
Admiral The Hon. Sir Edmund Fremantle, G.C.B., C.M.G.
Count Henry de La Vaulx (*Vice-President Aero Club de France*).
Sir David Salomons, Bart.
Sir Norman Lockyer, K.C.B., F.R.S.
Professor Sir William Crookes, O.M., F.R.S.
Sir Hiram S. Maxim.
The Rt. Rev. Bishop Welldon.
Martin Dale.
Henry Deutsch de la Meurthe (*President Aero Club de France*).

2. To announce result of Ballot for Committee.

3. To confirm the following alterations in the Club Rules :—

No. 11. Meetings of the Committee. The Committee shall meet at such times as it may arrange, and a special meeting may be summoned at any time by the Chairman, *Vice-Chairman or, in case of emergency by the Secretary*, or on a requisition signed by one-third of the members of the Committee.

No. 12. The quorum of the Committee shall be five, *except in the case of a special meeting summoned in accordance with Rule 11, when the quorum shall be three.*

Note.—The alterations (which are indicated in italics) were passed by the Committee at its meeting on November 11th, 1913.

No. 7. Ballot Papers. Not less than seven days before the Annual General Meeting a ballot paper shall be posted to every Member. The ballot paper shall contain the names of candidates nominated for the Committee in the form of an alphabetical list. The same type is to be used throughout.

Note.—The Committee at its meeting on February 17th, 1914, altered this rule by deleting the concluding words, "but the names of retiring Members of the Committee shall be indicated by an asterisk."

Committee.

The following members have been proposed for the Committee :—

Capt. R. K. Bagnall-Wild, R.E.
R. M. Balston.
G. B. Cockburn.
Maj. J. D. B. Fulton, C.B., R.F.A.
Maj. F. Lindsay Lloyd.
Robert Loraine.
Fred May.
J. T. C. Moore-Brabazon.
Norman Clark Neill.
Com. C. R. Samson, R.N.
Sir John Shelley, Bart.
A. Mortimer Singer.
T. O. M. Sopwith.
The Marquess of Tullibardine, M.V.O., D.S.O., M.P.

Members are reminded that ballot papers for the election of nine candidates to seats on the Committee of the Club must reach the Club not later than 12 noon Monday 23rd inst.

Committee Meeting.

A meeting of the Committee was held on Tuesday, March 17th, 1914, when there were present: Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, and the Secretary.

New Members.—The following new members were elected :—A. C. Benson, R. Forbes-Bentley, Sub-Lieut. Reginald Marix, R.N.R., O. P. Monckton, Baron Napier and Ettrick, A. B. Nugent, and Lieut. Edward Osmond, R.N.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

746 2nd Lieut. W. W. A. Burn (New Zealand Staff Corps) (Maurice Farman Biplane, Central Flying School, Upavon). Feb. 24th, 1914.
747 Leading Seaman Frank Barnshaw, R.N. (Maurice Farman Biplane, Central Flying School, Upavon). Feb. 26th, 1914.
748 1st Class A.M. Thomas Warren (Maurice Farman Biplane, Central Flying School, Upavon). Feb. 26th, 1914.
749 Alfred Edward Barrs (Grahame-White Biplane, Grahame-White School, Hendon). March 7th, 1914.
750 Denis George Murray (Caudron Biplane, Ewen School, Hendon). March 11th, 1914.

French Certificate.—The following Aviator's Certificate was passed in France :—

Valentine William Eyre (Blériot Monoplane, Blériot School, Buc). Feb. 26th, 1914.

Aerial Navigation Regulations.

Exemptions in the Southampton District.

The Club has recently been in correspondence with the Home Office with reference to exemptions in Southampton Water, and the Committee at its meeting on Tuesday last received a communication from the Home Office, intimating that the Secretary of State was prepared to grant the exemptions put forward by the Club. The matter will be considered by the British Manufacturers' Sub-Committee of the Club at its meeting next week.

Legacy to the Club.

A communication has been received from Messrs. Stanuell and Son, Solicitors, of Dublin, to the effect that the late Mr. Edward Robert Mackay Wright of Trinity College, Dublin, who died on October 19th, 1913, bequeathed the sum of Five Hundred Pounds to the Royal Aero Club, to be used as the Committee think best for the advancement of aviation.

The Late Capt. Allen and Lieut. Burroughs.

The sad news of the fatal accident to Capt. C. R. W. Allen and Lieut. J. E. G. Burroughs was received at the Club with great sorrow. Both these Officers were members of the Club and frequent visitors at its Head Quarters.

The military funeral took place at Bulford on Monday last, and among the many floral tributes was a wreath from the Members of the Royal Aero Club. The private funeral of Capt. Allen took place at Woodchester Stroud on Tuesday, at which the Club was represented by Mr. C. G. Grunhold.

Daily Mail £5,000 Circuit of Great Britain.

The following entries have been received by the Club :—

Sopwith Aviation Co., Ltd. ... ... Kingston-on-Thames.
Messrs. A. V. Roe and Co., Ltd. ... Manchester.

Monaco Aviation Meeting.

The Monaco Aviation Meeting will take place from April 1st to 15th, 1914, and included in the programme is the International Maritime Race for the Prize and Cup presented by M. Jacques

Schneider. The British Empire will be represented in this Race by the Sopwith Aviation Co., Ltd., and Mr. John Carbery.

In the Aerial Rally, which also forms part of the programme, Messrs. Farman have entered M. Pierre Verrier, the well-known Hendon pilot. M. Verrier will make the flight from Hendon to Monaco, *via* Calais and Dijon, some time between April 1st and 15th.

At the Monaco Aviation Meeting the Club will be represented by the following officials :—Mr. Harry DelaCombe, Mr. N. C. Neill, Mr. G. Holt Thomas, and Mr. H. E. Perrin (Secretary).

Presentation to the Club Library.

Mr. Gustav Hamel and Mr. C. C. Turner have kindly presented to the Club Library a copy of their book "Flying, Some Practical Experiences."

166, Piccadilly, W. HAROLD E. PERRIN, Secretary.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Raining all day Monday last week ; no flying.

Tuesday, two Shorts, two B.Es., two Avros at work. Commander Samson returned from Battle on Short tractor ; Lieut. Briggs from Eastbourne on Blériot. Lieut. Marx left for Hendon on Caudron, returning at dusk. Lieut. Spenser Grey arrived on 90 h.p. Sopwith tabloid from Hendon about 3 p.m. J. Alcock arrived on 150 Sunbeam-M. Farman from Brooklands.

Wednesday, Short tractor 140 h.p., Commander Samson ; Short 3, two other Shorts, 80 and 100, two Avros, Caudron, 80 Gnome-Deperdussin, two Sopwiths, M. Farman, H. Farman up. Three other pilots up for altitude, Lieut. Briggs topping the list, and incidentally getting the British height record, 15,000 ft. on the 80 Le Rhone-Blériot ; when he decended he was hardly recognisable, his face being very badly swollen owing to the intense cold.

Thursday, wet first thing, afterwards fine. H. Farman, Sopwith, Avros, and Short machines up. Friday, wind and rain, but Short machine was up. Saturday and Sunday, gale.

Civilian Flying.—Tuesday, The Hon. M. Egerton made two flights in usual good style. Prof. Huntington, one flight.

Brooklands Aerodrome.

MONDAY, last week, no flying was possible, but on Tuesday the Vickers and Bristol schools were at work during the most favourable portion of the day. Mr. Merriam is now back at work at the Bristol School, and was flying in quite his old form. The wind varied between zero and 32 m.p.h.

Mr. Halford made a couple of flights on Wednesday up to 1,000 ft. on Bristol biplanes. The Bristol and Vickers pupils were busy. The new Martinsyde monoplane underwent a fine test up to 7,000 ft. for half an hour. Mr. Barnwell was out on the 70 h.p. Vickers biplane. Mr. J. Alcock returned from Eastchurch on Mr. Coatalen's Maurice Farman (100 h.p. Sunbeam) biplane at 3,000 ft. with a passenger. In the afternoon, the Vickers and Bristol schools were at work. Mr. Merriam made a fine solo flight on a Bristol bip'ane. The Martinsyde monoplane was again flying well with passengers, amongst whom was Mr. Dukinfield Jones. The wind did not rise higher than 19 m.p.h.

On Thursday no flying was possible in the day time, but tempted out shortly before midnight by the glorious moonlight, Mr. J. Alcock made a cross-country flight with a passenger (Mr. F. L. Bailey) up to 2000 ft., concluding with a very fine spiral landing. The next day there were many enquiries as to the identity of the pilot, some people evidently taking the machine for a "scare plane"!

On Friday, Saturday, and Sunday no flying at all was possible owing to the gales and rain.

Bristol School.—Rain and wind all day Monday, last week.

Merriam for a good high test early Tuesday, afterwards taking Sergt. Deane up to nearly 2,000 ft. around surrounding country, pupil having control most of the time, during half hour's flight. Later behind same pupil on several straights. Afterncon too windy.

Wednesday, 6.30 a.m., Halford two long test flights to 1,000 ft. before pupils arrived. Then took Sergt. Deane on circuits, afterwards behind him twice on straights and landings. Mr. Racine-Jacques twice out doing several straights, solos. Merriam up later, but was too bad for tuition. Afternoon, Merriam and Halford testing machines, afterwards the former instructor behind Sergt. Deane on straights. Too bumpy for further tuition.

Thursday, early, blowing a gale and raining hard. Flying impossible all day, and the same up to Saturday.

Vickers School.—Tuesday last week, Instructors Knight and Elsdon on biplanes with Lieuts. Acland, Mansergh and Leighton. Barnwell with Comte Fitz-James (new pupil).

Wednesday, Barnwell, Knight and Elsdon on biplanes with Messrs. Wilberforce Hurst, Duncan and Murray ; also with Lieuts. Acland, Mansergh, Leighton, Capt. Phillips and Comte Fitz-James.

Sunbeam Activity.— J. Alcock on Maurice Farman with 100 h.p. Sunbeam engine, at Eastchurch, and flew for one hour with passenger. On Wednesday, Alcock flew to Brooklands, with Mr. W. Ranger as passenger, first half of journey being very foggy. On Thursday he made a fine moonlight flight with Mr. F. L. Bailey as passenger, going across country over Walton and Staines at a height of 2,000 ft., landing with a fine spiral and *vol plané*. The ascent was made at 11.15 p.m., and he was flying for half-an-hour.

Liverpool Aviation School, Waterloo.

On Monday last week, J. Crean, a new pupil, was out rolling for the first time, putting in two hours early and another two in the evening. Considering he is quite unacquainted with any form of motor driving, he handled the machine remarkably well.

On Wednesday Melly was out trying the new 70 Isaacson engine on his two-seater, doing a couple of flights of 7 and 5 mins., but the rest of the week has been quite unfavourable for any trials, though the machine is now thoroughly tuned up.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Tuesday, last week, Messrs. Kershaw, Cowley, Parker and Prince Sapieha circuits with Mr. Howarth in passenger seat. Messrs. Graham, Norris, Bjorkland, Lillywhite, and Lieut. Lindop solo circuits. Mr. Robinson (new pupil) trial flight. Wednesday, Mr. Tapps circuits with instructors Howarth and Cripps in passenger seat. Messrs. Lillywhite, Bjorkland, Graham, and Lieut. Lindop solo circuits.

W. H. Ewen School.—It rained all day Monday, last week. At 7 a.m. on Tuesday, Mr. Goodden made a test flight, after which Mr. Bankes-Price did circuits at 200 ft., and Mr. F. Curtis straights. Mr. Warren test flight on 35 h.p. Caudron No. 1, Mr. G. Carruthers straights. At 4 p.m. Mr. Goodden test flight, after which Mr. Murray and Mr. Bankes-Price did circuits. On 35 h.p. Caudron No. 1, Mr. Verney first lesson in rolling.

At 6.45 a.m. on Wednesday, Mr. F. W. Goodden made a test flight on *brevet* machine, after which Mr. D. G. Murray went through the first half of his *brevet* tests in excellent style. On the 35 h.p. Caudron No. 1, Messrs. Carruthers, Garvin, and Curtis straights, Mr. Verney rolling. Four p.m., Mr. Goodden test flight. Mr. Murray passed altitude flight for R.Ae.C. certificate in good style. Mr. Bankes-Price circuits at 500 ft. Mr. Warren test flight on 35 h.p. Caudron No. 1. Messrs. Curtis, Garvin, and Carruthers straights with good landings. Mr. Verney rolling.

It was too windy on Thursday for pupils' practice. In the afternoon, Mr. Goodden made excellent exhibition on 45 h.p. Caudron.

Hall School.—Although the past week was very windy and wet, the pupils managed to make good progress. On Tuesday Messrs. Palmer and Brookes made some very good circuits, and Virgilo and Gering straight flights. In the evening A. L. Brookes made two circuits at 100 ft. and then made excellent figure eights at 150 ft. L. Palmer (who has only been at school three weeks) made some good circuits at 80 ft., and is now ready for figure eights. Messrs. H. Gering, A. F. Arcier and Virgilio made very creditable flights at 40 ft. and are improving very rapidly. T. Gore, new pupil, was making good progress in rolling. New pupil, B. Haines (a scholar at The Merchant Taylors' School), has joined school. Miss Sophie d'Elsa, who has been absent from school for some time, is re-commencing practice next week. In spite of the awful weather experienced lately, J. L. Hall has made several trips on Avro. L. Palmer and A. L. Brookes have both shown good progress and aptitude, especially the latter, who should soon qualify for *brevet*. Messrs. H. Gering, Virgilio and Arcier are also "making good," and are ready for circuits. H. C. G. Allan, who has been supervising the rebuilding of his 35 Blériot, is now ready to complete his tuition and apply for certificate.

Salisbury Plain.

Bristol School.—Monday, last week, snow storms and rain.

Tuesday, Busteed climbing test on scout machine. Busteed and Mr. Stutt, testing bomb-dropper. Voigt two trials, then tuition to Mr. Hay (1) Lieut. Bolitho, Lieut. Barrett, Lieut. George, (3 each). Weather fairly good till 9 a.m. then very windy after.

Busteed, on scout machine up for 10 mins. Tuesday evening. Jullerot on 80 h.p. tractor up for 5 mins. Wind too gusty for school work. Jullerot and Mr. Delaplane on 80 h.p. tractor. Busteed and Lieut. George on 80 h.p. tractor. In both cases too bumpy for testing bomb-dropper. Busteed tuition to Lieut. George and Lieut. Barrett. Jullerot tuition to Lieut. George (2), Lieut. Barrett (2), Lieut. Bolitho (2) ; then storm again.

Busteed three flights, Wednesday morning, on the scout machine for climbing tests. Jullerot tuition to Mr. Delaplane on 80 h.p., then to 2,300 ft., test bomb-dropper. Voigt trial, then tuition to Lieuts. Barrett and George. Lieut. Barrett first solo—300 ft. Mr. Delaplane first solo on 80 h.p., 10 mins. at 1,000 ft. (good). In evening windy till half-past five. Then Busteed speed and climbing tests with two different propellers. Mr. Delaplane one solo, 20 mins. at 1,500 ft., good *vol plané*. Starts 15 mins. at 1,000 ft. Friday and Saturday, heavy gales and hail storms.

LESSONS ACCIDENTS HAVE TAUGHT.*

By COL. H. C. L. HOLDEN, C.B., F.R.S., F.R.Ae.S..

WHEN I was asked some six months ago to contribute a paper to this Society dealing with the lessons to be learnt from the study of the causes of accidents when flying, I agreed to do so because it seemed to me that a discussion upon this subject could not fail to be of interest and advantage to pilots, constructors, and others by bringing before them in collective form the accidents, preventable and otherwise, which have happened, and in particular those which have been investigated by the Accidents Investigation Committee of the Royal Aero Club, on which your Chairman of Council, Gen. Ruck, and several other Fellows and Members of the Aeronautical Society are very useful workers.

The Work of the Accidents Investigation Committee.—I would here remark that the Accidents Investigation Committee was formed in the early part of 1912, and that the first accident it inquired into was one which happened at the Brooklands Aerodrome on May 13th in that year. Since that time, and up to the present date, eighteen other fatal accidents—one of which was an accident to a spectator—have been investigated, and reports upon them issued by the Royal Aero Club. With a view of obtaining as wide publicity as possible, these reports have been sent to, and published by, the technical and lay Press; and, moreover, copies have been supplied to the Home Office, Admiralty and War Office, at the request of these departments of the State, all of whom have, in one way or another, rendered the Committee great assistance, and upon more than one occasion have expressed their appreciation of its work.

The Collection of Data after Accidents.—It may be opportune at this point to impress upon my audience the difficulty that exists in ascertaining the exact causes of accidents to aircraft. Where the accident is immediately attended with fatal results, it is obviously impossible to obtain the evidence of the principal actor or actors in the tragedy, and even where the accident is not fatal, but only results in injury, as is well known, there is generally a loss of memory on the part of the victim, not only of what occurred after the accident, but of what took place before it, which makes such evidence very unreliable. Again, the evidence of spectators has to be sifted with the very greatest care and caution. The appearance of an aircraft in the air is, from its nature, deceptive, and its exact aspect, position and direction is very difficult to appreciate, even to the most expert in such matters, and in very few cases indeed can conclusive direct evidence be obtained. The evidence of the unskilled spectator is more often than not obviously incorrect and worthless. It is of prime importance, too, that when an accident occurs, the portions of the wreckage should only be disturbed so far as to allow any human beings to be removed, and even then any portions disturbed from their places should be as soon as possible restored to their original positions. The great importance of this matter has been recognised by the authorities at the Home Office, who have issued instructions to the police throughout the country that in the event of an aircraft accident occuring, the wreckage and site are to be guarded, and no interference permitted until the Accidents Investigation Committee or its representatives have examined it.

The Scope of the Paper.—I have not attempted in this paper to discuss the causes of accidents which have occurred since the art of flying was first discovered, or even the accidents which have occurred all over the world since flying became a practical possibility and comparatively common, for the reason that in only a few isolated cases has any complete investigation been made as to the cause of any accident in this or any other country until the Accidents Investigation Committee commenced its work. Apart from this, I think I shall be able to show satisfactorily that the causes which have originated the accidents which have been inquired into by the above committee happen to cover the whole ground as far as one can judge.

The Classes of Accidents.—The causes of accidents may be divided into two classes :—

A. Those due to the pilot.

B. Those due to faulty design or to mechanical failure of some portion of the aircraft.

Under A may be classed :—

1. Want of sufficient knowledge or skill in flying; errors of judgment.

2. Attempting hazardous feats or taking unwarranted risks in flying.

3. Momentary loss of control, such as, for example, the accidental releasing of hand or foot controls, and not regaining them in sufficient time.

4. Complete loss of control due to sudden seizure, loss of consciousness, &c.

5. Loss of control owing to atmospheric disturbance, a violent gust of wind, for instance.

Under B may be classed :—

1. *Dangerous and inherent instability due to faulty design.*—Failure of some essential portion of the aircraft owing to fault in design, insufficient strength having been provided to meet the stresses that the part or parts might be subjected to in the air.

2. Failure of some essential part due to flaw or irregularity in the material of either engine or other part of the aircraft.

3. Failure due to repairs or alterations not having been properly carried out, or to fittings, such as bolts, nuts, screws, &c., having worked loose which had not been tightened up or otherwise made secure before the aircraft left the ground.

4. Fire caused by leakage of pipe carrying petrol, or of tank, the petrol being lighted by spark or flame from the exhaust. This may occur in the air, but it is more likely to take place owing to breakage of pipes or tank when an aircraft strikes the ground.

The above comprise, so far as my experience goes, all the various causes to which the accidents to aircraft are primarily attributable, and it will be readily seen that many of them can be guarded against more or less effectually, if not entirely prevented, by suitable precautions being taken.

The Causes of Accidents Examined.—Taking the causes seriatim :

A. 1. *Want of Sufficient Knowledge or Skill.* It is clear that this is not the most frequent cause of accident with fatal results, or more pupils and learners would have been killed than skilled pilots. Such is, however, not the case; indeed, it is surprising how few aviators have met with fatal accidents during such time as they were learning to fly, *i.e.*, during the period before they have obtained their pilot's certificates.

Errors of judgment have, however, caused a number of fatal accidents, through side-slips, over-banking and diving too steeply when close to the ground, and over-estimating the speed of the aircraft.

2. *Hazardous Flying.* There is little to be said in favour or in justification of taking unnecessary risks and indulging in what may be termed dangerous flying, especially if close to the ground, when a slight miscalculation or error of judgment may involve the pilot in a disaster.

It is hardly conceivable that an expert pilot should be so foolish as to jeopardise himself in such a manner.

3. *Momentary Loss of Control* has, unfortunately, caused more than one fatal accident, and is one of those things that may happen to any pilot, however experienced he may be. Instances have occurred from time to time of control being temporarily lost in this way—luckily without fatal results—as, for example, in the Circuit of Britain last year.

In most designs of aircraft the elevator control is so arranged that if the pilot, when diving steeply, should slip forward in his seat on to the controls, the effect would be to make the aircraft dive more steeply still, and so render it still more difficult for the pilot to right his machine.

As a matter of principle, it would appear better to arrange the elevator control to work in the opposite manner, *i.e.*, to reduce the angle of descent instead of increasing it under the above circumstances. Unfortunately, it is late, perhaps too late in the day to make any alteration in this direction, even if considered desirable, owing to the number of those who are accustomed to the present system.

4. *Physical Failure of Pilot.*—There has been one instance where loss of consciousness, owing to the pilot being in such a state of health that he was unfit to fly at all, caused his death, and in more than in one other case this has been, with good reason, the suspected cause of the accident.

5. *Violent Gusts or other Atmospheric Disturbances* have caused accidents which have terminated fatally owing to the pilot losing control, but generally only when the aircraft has been comparatively close to the ground and control could not be regained in time.

We now come to the causes which I have classified under the heading B :—

1. *Faulty Design* has in the past undoubtedly caused unnecessary loss of life; want of knowledge as to the magnitude of the forces which had to be resisted, the stresses to which various portions of the structure were subjected, and generally the conditions under which the aircraft flew, was responsible to a great extent in former days for the failures. Design and construction are now, however, thanks to the practical experience and scientific study of the problems involved, rapidly becoming exact sciences, and except in isolated instances of experimental machines, we may expect failures from bad design to become rare.

* Paper read before the Aeronautical Society of Great Britain, at the Royal United Service Institution, Whitehall, S.W., on March 18th, 1914.

2. *Failure of Material.*—The sudden failure of some essential part due to a flaw or some other fault in material, whether it be of the engine or some structural part of the aircraft, is, I fear, an instance of the occasional fallibility of all sorts of mechanism and material, and one that it is impossible to absolutely guard against. Accidents from this cause are, happily, of rare occurrence.

3. *Faulty Repairs or Alterations Imperfectly Carried Out* have, unfortunately, caused loss of life on more than one occasion.

Lessons to be Drawn and Remedies Suggested.—Having now considered the various causes which originate accidents, and also in a general way their relative importance in the production of accidents, I will now turn to the lessons to be learnt from the accidents and their causes, and the means to be taken in order to avoid as far as possible their recurrence. I have purposely avoided referring to any names in connection with the subject of the causes of accidents, as my remarks are intended to be general, and no particular purpose would be served by indicating any particular instance, more especially since in nearly every case of accident some blame may be attributed, or thought to be attributable, to individuals, whether pilots or others. I should be extremely sorry that any statement I might make should be the cause of pain to anyone interested. For convenience I will again take the causes of accidents in the order in which I have scheduled them, and as far as possible suggest the natural remedies or precautions which should be taken to prevent them.

A. 1. Training of Pilots. I have already called attention to the fact that accidents of a fatal nature to pupils under tuition are rare. This in itself shows that the various schools where aviation is taught exercise great care in preventing their pupils incurring unnecessary risks, it being obviously to their own benefit and also to that of their pupils, actual and prospective, that accidents, from whatever cause, should be as few and far between as possible.

2. Hazardous Flying, &c. Common sense on the part of pilots themselves is the best safeguard against accidents from these causes.

No regulations, whether issued by the Royal Aero Club or even by the Government in the form of an Act of Parliament, will prevent a man doing foolish acts; if, as a result, he is killed, he has paid the extreme penalty of his foolishness. If he is injured only, he may be punished by law, but this will not disturb him so much, probably, as the knowledge that the accident was entirely his own fault and that he will not get any pity from others. Nor does he deserve any on that very account.

3. Accidents occurring from momentary loss of control under an entirely different category and would appear to call for improved designs, in which such possibilities as feet slipping off bars or pedals, or hands slipping from levers or wheels, or the pilot slipping bodily out of his seat, are guarded against. I have already referred to the possible effect of the latter.

One method of guarding against this is in everyday use with some pilots. I refer, of course, to the employment of a broad band or strap securing the pilot into his seat; such a band or strap is and must be fitted with some reliable quick-release device, whereby the pilot can instantly release himself with one hand when necessary. It is curious that whilst some pilots advocate very strongly some such method of securing themselves in their seat, other pilots are just as strongly against it. Probably there is a certain amount of sentiment about this; men do not like being tied up or locked in under any conditions and in any place, even when they know that they can immediately release themselves. An impartial examination and consideration of the accidents which we have investigated leads me to the opinion that the advantages of the belt to secure the pilot in his seat more than counterbalance the disadvantages. In no less than six fatal accidents out of eighteen, where the belt was not used, its employment might conceivably have saved the pilot's life, and might in more than one of these instances have enabled the pilot to regain control, and avoid any accident occurring at all.

It is quite clear, I think, that pilots generally could not be compelled, at the present time, to strap themselves in to their seats; neither could such a law be made until the great majority agree that it should be done owing to it having been clearly proved that the increased degree of safety thereby obtained justified compulsion. What can be done now is merely to keep records and compile statistics on the subject for the benefit of those concerned. I would only add that apart from the question of loss of control following upon losing their seat, pilots have been killed by being thrown forward violently against a strut or other portion of the structure on the aircraft striking the ground. This could hardly have occurred had they been secured to their seats; on the other hand, it may be argued that a pilot may stand a better chance of escaping with his life if, not being strapped in, he jumps or is thrown clear of the aircraft on its striking the ground.

In any case there can be no valid objection to the use of a safety helmet, which, forming as it were a cushion or buffer between the head and the object struck, does, in effect, convert a blow, which would in most cases be a very violent one, into a push. If the same ingenuity that has been devoted to shock absorbers for landing skids, &c., were applied to contrivances, the simpler the better, for reducing the shock of impact on the human body in the case of a fall, by spreading it over a longer time, it is my opinion that more lives would be saved than at present is the case.

4. The Physical Fitness of Pilots. Though sudden illness cannot, of course, be entirely prevented, still the instances when it occurs will be very rare. I think everyone will agree that no pilot is justified in taking up an aircraft when he is in bad health or recovering from a serious illness, unless he has taken a medical opinion on his condition, and this is to the effect that he is fit to fly. The matter is even more important if he contemplates taking a passenger or passengers up with him.

I am strongly of opinion, which I know is shared by others, that no one who is not sound in body or limb should be permitted to learn to fly at all. Such a person who becomes a pilot is always a potential source of danger to himself and others. No real hardship could result if flying schools would only accept as pupils those who had passed a medical examination, with a view to establishing that physically they were fit for such work. The examination should be a special and thorough one, such as a candidate for the Army or Navy or Civil Service has to pass.

The question of the fitness of pilots who have already got their certificates is more difficult to deal with effectively. When pilots are employed in carrying passengers, as is now the case to a very limited extent, but may in the near future become widely spread, it seems to me that the public will insist on such precautions being taken in this direction as will ensure their safety being reasonably safeguarded.

The fifth cause of accident, viz., violent atmospheric disturbance overcoming the pilot's controls, is one which the human being cannot govern, and accidents from this cause cannot, therefore, be entirely prevented. It is quite clear, however, that they are rapidly being minimised by the use of more powerful engines and by the increasingly greater skill of the pilot, who, it would appear, is now able to right his aircraft from any conceivable position into which it may have been forced, provided he has sufficient vertical space in which to carry out the manœuvre.

I now come to the causes of accident enumerated under the second heading, B:—

The first of these, namely, the failure of some essential portion of the engine or aircraft owing to the design of such part having been wrongly calculated or calculated on insufficient data to ensure the necessary strength to resist the stresses to which it is put, is a fault that, a few years ago, might have been pardonable owing to the want of technical and scientifically accurate knowledge, but at the present time there is no more excuse for any aircraft being built without the proper calculations having been made to ensure a sufficient factor of safety of all the parts under the conditions of flying than there is for the construction of a bridge, ship, gun or any other structure being built in a similar manner.

To build an aircraft by the so-called rule of thumb, and by that alone, is to court disaster, and it is a melancholy fact that valuable lives have been lost by the failure of such aircraft when flying. The responsibility for sufficient strength in the design is a grave one, and at the present time rests entirely with the designers and constructors of the aircraft, except in the case of aircraft supplied to the Government, in which case the approval of the design, if such is approved by the authorities, shifts a certain amount of the responsibility on to their shoulders.

If aircraft become common, as some people think they will be in the near future, it is quite possible, and, indeed, desirable, that their design and construction should be investigated and approved by some specially appointed authority before they are put into service.

2. Choice and Testing of Material. As regards the second cause of accident, viz., the failure of parts owing to flaw or irregularity in material, the only remedy, and even this is not an infallible one, is care in selection of suitable material for the purpose, and the taking of tests to ensure uniformity. Also, and this is an all-important matter in the case of the alloy steels in vogue to-day, the proper thermal treatment.

No failure of material, it must be remembered, occurs without some good reason, upon which careful investigation in most cases throws a light, and this enables the particular cause of failure in the same part, and under the same circumstances to be avoided.

The third cause of failure, viz., that due to repairs or alterations not having been properly carried out, or to want of adjustment, or securing of parts after adjustment, is one for which the remedy is so obvious as hardly to call for remark or suggestion. The onus lies with the owners of the aircraft to see that no pilot is allowed to fly an aircraft unless it is certain, so far as can be ascertained by a careful examination made by a really competent man or men, that not only is the aircraft in a safe condition, but that the engine is working normally. If this had been insisted upon, at least two fatal accidents would not have occurred in the manner and when they did.

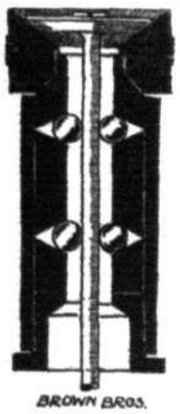
4. As regards precautions against fire, either in the air or on the ground, the first step to be taken in the arrangement of the relative positions of petrol pipes and tank and ignition wires and exhaust exits or pipes, so that the petrol is kept as far away from danger of ignition as possible. The next is to provide means for readily shutting off the petrol supply, in an emergency, close to, if not actually within the petrol tank itself. Fire originating in the carburettor through the engine firing back can probably be prevented by a suitable arrangement of metal gauze discs in the induction pipe, acting on the well-known principle which is used in the Davy Miners Safety Lamp. The agony of mind and body suffered by a pilot who, after a fall, is imprisoned in the aircraft owing to breakages or the position the aircraft has taken up on falling and is then enveloped in flames due to escaping petrol having become ignited, is too horrible to contemplate. Unfortunately, this form of accident has happened only too often, and it is difficult to see how it can be entirely averted. I know of no means at present.

In conclusion, I should like to call the attention of those more particularly interested in the design and construction of aircraft to the very excellent and complete series of recommendations made by the Departmental Committee on the Accidents to Monoplanes, 1912, and to be found in their report on p. 11. The recommendations in question are well worth careful study.

SOME ACCESSORIES AT OLYMPIA.

The British Petroleum Co., Ltd. (109), 22, Fenchurch Street, London, E.C. To "describe" the exhibits on this stand would be hopeless, in spite of the invaluable nature of them, for there is not much of interest in tin cans—mostly red! "Shell" spirit, however, is so well known that it is hardly necessary to remind readers that nearly "everybody uses it." The models shown on this stand are interesting; they consist of silver models of such famous aeroplanes as the late S. F. Cody's biplane, Hamel's Dover-Cologne Blériot, the Grahame-White biplane which won the "Shell" Trophy at Hendon last year, whilst a model of one of the large tank steamers used for conveying "Shell" spirit to England is also worth inspecting.

Brown Bros., Ltd. (6), Great Eastern Street, London, E.C. The "Rapid" valve truer, which is illustrated by the accompanying sketch, shown amongst numerous other accessories and tools on this stand, is a really useful article for the aviator—to say nothing of the motorist, motor-cyclist and motor-boatist—especially if the engine has to be looked after personally. As its name implies, it is a device for quickly and easily truing or re-seating the engine valves. It consists of a tubular casing screwed into one end of which is a conical cutter, whilst fitting inside is a double-coned piece and a single-coned piece which form ball races for two sets of balls. The size of these races is varied by an adjusting nut, which screws in or out of the other end of the casing. The valve stem is inserted through the centre of the cutter and casing, and is held firmly, but free to rotate, in the ball-bearing, by tightening the adjusting nut. Some thick oil is then applied to the surface of the cutter and the valve head is pressed gently down on the cutter and rotated in a clockwise direction by means of a screwdriver, as in grinding valves. A few turns will produce a true face as good as new. Before inserting the valve, all carbon should be removed by means of a special carborundum cutter provided with the truer. It will be seen that by adjusting the size of the ball races, any size of valve stem, within limits, can be inserted and held in this device. After the valve has been trued it is advisable to place a small quantity of cutting compound between the valve and the seat in the engine and grind the valve in in the usual way. The price of the device is £1.

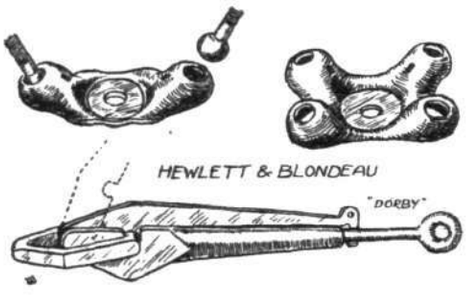


Cellon, Ltd. (104), 17, Old Broad Street, London, E.C.—"Sell on, Cellon," is what B. C. Hucks wrote on a signed portrait of himself which forms one of several interesting photographs to be seen on this stand. That it does sell on is evinced by the fact that among the users of Cellon dopes and varnishes are the Admiralty, the War Office, the Australian Government, the Aircraft Manufacturing Co., Ltd., British and Colonial Aeroplane Co., Ltd., W. H. Ewen Aviation Co., Ltd., Handley Page, Ltd., A. V. Roe and Co., Ltd., Short Bros., Sopwith Aviation Co., Vickers, Ltd., White and Thompson, Ltd. (Curtiss), &c., and many private aviators as well. Another very large order has just been received from the Government. Cellon dopes are made in several solutions to suit various purposes, but the most important ones are the fire-proofing solutions and the special finishing coat. The former renders the fabric absolutely fire-proof, and the latter can be used for both fabric and woodwork (floats, &c.). Cellon dopes and varnishes are also made for use on models, J. Bonn and Co., Ltd., of 97, New Oxford Street, W.C., being the sole agents for this branch. Cellon transparent sheets are another speciality. They are non-flammable, impervious to the effects of water, petrol, oil, &c., and are brilliantly clear. Those visitors to Olympia who have not yet witnessed aerial looping the loop should go the Cellon stand and ask to see a Cellon looper, which are being sold at a few pence each for the benefit of Marcel Desoutter, and have already brought in something well over £5.

A. Dunhill, Ltd. (45), 359-361, Euston Road, London, N.W. A very complete range of clothing is displayed on this stand, of which special mention may be made of the one-piece overalls, made either in Dungaree or leather. Various forms of safety helmets and woollen caps can also be seen. Goggles, gloves and wraps are, of course, included in the display, whilst the lady aviator is also specially catered for. Besides clothing, the visitor may inspect a large selection of accessories for the aeroplane itself, such as compasses, watches, aneroid barometers, maps and map cases, tools and tool-kits.

The General Aviation Contractors, Ltd. (48), 30, Regent Street, London, S.W. As noted in our preliminary report last week, no exhibits are to be seen on this stand, which takes the form of a reception room, where all particulars are willingly given in connection with the various concerns associated with the "G.A.C.," viz.:—The British Anzani Engine Co., Ltd., and the British Emaillite (dope) Co., Ltd., of London, and the Societa Anonima Costruzione Aeronautiche "Savoia" of Milan (the sole concessionaires and manufacturers of the Henry and Maurice Farman aeroplanes in Italy and the Italian colonies), and the Agenzia Generale Forniture Aeronautiche of Milan, which is the Italian branch of the "G.A.C." The stand is most artistically decorated and arranged, while on the walls are hung a few photographs (closely connected with G.A.C. matters). The furniture is both in keeping with the scheme and comfortable, and we confidently advise all visitors who are interested in the practical side of aviation on no account to miss this stand, but to call and obtain all the information they can possibly require in reference to "G.A.C." specialities and aeronautical matters in general.

Hewlett and Blondeau (73), Vardens Road, Clapham Junction, London, S.W. There are not many fittings required in the construction of an aeroplane that cannot be obtained from this well-known firm of aeroplane constructors. On the stand are displayed a number of such fittings, and three that are of special interest are shown in the the accompanying sketches. The latest pattern of the quick release wire strainer (Dorby patent) is both simple and effective. To release the cable the hooked end of the hinged arm is released from engagement

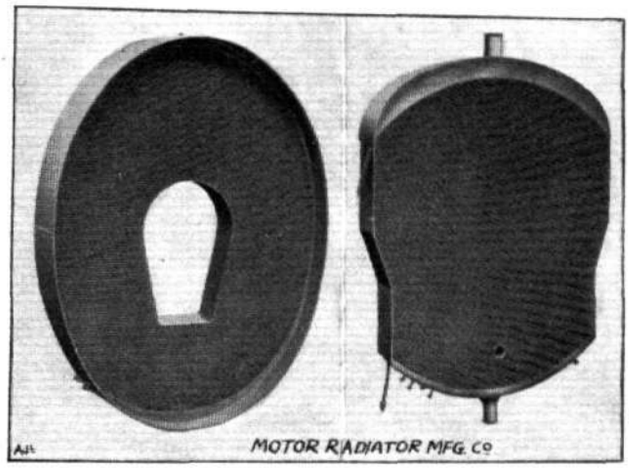


with the eye bolt and the cable-eye can be slipped off the arm. The stamped eye plates shown above the strainer are fitted with ball and socket joints for the strainer screws. The advantages of this form of joint are obvious, vibration is diminished, and the mounting of the cables is rendered both simple and quick. The strainer, which can be obtained in any size, can be fitted to the bolt at any angle ranging up to 50°—another advantage. Special attention must be drawn to the welding by the Oxy-Acetylene system and other metal work shown. Another excellent piece of metal work consists of a length of drawn steel tubing which has been so rolled that it tapers from the centre towards each end and then opens out again at the extremities. The main point about this job, however, is that the amount of metal is not reduced as the section gets smaller, so that the strength is where it is most required. All kinds of work of this description is taken up by Messrs. Hewlett and Blondeau, and steps are being taken to manufacture all the various fittings supplied in the country. Other specialities seen on this stand are wire and cables, stranded or otherwise, and S.P.L.A. dopes.

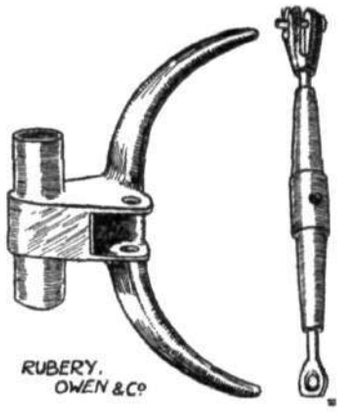
The Birmac Model Aeroplane Co. (7), 124, West Green Road, Tottenham, London, N. Undoubtedly a great deal can be learnt from model aeroplanes, but for the amateur who has built or bought a model and finds it is not always easy to fly it to gain that information. The above Company, however, have some really good little flyers on view on their stand which are easy to handle, so that it is possible for one to get a good idea of how an aeroplane flies. The great feature of these little models is that they are cheap, ranging from a shilling upwards. For the more advanced model aviator are some well-made accessories for models, such as wheels and propellers (Avanti hand-carved).

The Integral Propeller Co., Ltd. (21), 1B, Elthorne Road, Upper Holloway, London, N. Two very interesting exhibits are to be seen on this stand apart from the large array of standard Integral (Chauvière) propellers. Perhaps the most important of the two exhibits referred to is M. Chauvière's variable pitch propeller. In its present form it is only suitable for dirigibles, but we understand that it may be adapted for aeroplane work later on. The advantages of a variable pitch propeller, especially for dirigible work, are obvious. The method in which this new propeller operates is as follows:—The propeller is mounted on a fixed plate, bearing an internally toothed ring engaging with three planet wheels, which in turn mesh with a toothed wheel on the propeller boss. This latter wheel actuates, through worm gearing, each of the blades, but only if the fixed plate be rotated a certain amount, for it will be seen that under normal conditions when the propeller revolves, the wheel on the boss, through the medium of the planetary wheels, is carried round with the propeller. The necessary movement of the plate to vary the pitch of the blades is obtained by means of a rack and pinion gear, operated from the *nacelle* of the dirigible. The other device consists of a "quick expelling nut," which greatly facilitates the fitting and removal of the propeller on to the engine shaft. Briefly, the boss carrying the propeller, which slides on the coned engine shaft, has an internally threaded portion to receive the nut. The latter is also internally threaded so as to screw on to the engine shaft, but the threads in each case are opposite, *i.e.*, left and right, or right and left, according to the direction of propeller rotation. The boss with the propeller is first slid into position on the engine shaft, and the nut is screwed on to the latter to an extent previously ascertained by adjustment. The nut is then locked with the boss by means of a spring clip, and is thus firmly and safely secured.

The Motor Radiator Manufacturing Co. (36), Warwick Road, Greet, Birmingham. Two of the radiators exhibited on this stand and shown in the illustration are of the type supplied to the Royal Aircraft Factory. These radiators, and others manufactured by this firm, are of the original honeycomb or Zimmermann type. That is, they are built up, in a frame, of a number of layers of small tubes stacked one on the top of the other. The ends of these tubes are expanded so that there is a space round each tube. The whole stack of tubes is then immersed in liquid solder so that the expanded ends are joined together leaving the opening through the tubes clear. A tank is thus formed through which a number of tubes pass right through; thus it will be seen that, with water inside, a large cooling area is provided in a very small space—about 2 sq. ft. per h.p. Another type of radiator, shown in various forms, is known as the flat tube type, and, as the name implies, is built up of a number of thin flat tubes secured top and bottom into headers.



Rubery, Owen and Co. (17), Darlaston, South Staffs. In view of the increasing use of steel for aeroplane work in this country, Messrs. Rubery, Owen and Co.'s exhibit is of special interest to the aeroplane constructor, for this firm has great experience in steel work, and for some time now have made a speciality of aeroplane work. They have several interesting examples of what can be done in this way—especially so far as welded tubular and pressed steel work. In the accompanying sketch is a specimen, picked at random, of their welding work—in which both the oxy-acetylene and electric systems are employed. Two samples of welded tubular engine mounting are well worth inspection, a load of ½ ton having been applied to one with no ill effects. We also show in the sketch one of the latest pattern wire strainers (R.A.F. pattern) with an exceptionally neat forked end. The Rubery Owen patent aeroplane release gear, which is being used with great success by numerous aviators now, is also shown, in addition to a very large range of other fittings.



ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending March 13th, 1914:—

No. 2 Squadron. Montrose.—2,806 miles in all were flown by the pilots of this squadron during the week. Practice in reconnaissance work and in landing away from the aerodrome was continued.

No. 3 Squadron. Netheravon.—A considerable amount of reconnaissance work was carried out, including a flight by Lieut. Cholmondeley at 10 p.m. lasting three-quarters of an hour.

No. 4 Squadron. Netheravon.—The officer and N.C.O. pilots were flying daily throughout the week. Capt. Shephard flew at night over Salisbury Plain and tried landing by various lighting arrangements.

No. 5 Squadron. S. Farnborough—Amongst other flights by the pilots of this squadron, Major Higgins flew the new S.E. single-seater to Netheravon.

No. 6 Squadron. S. Farnborough.—Various reconnaissance flights were made on B.E. and M.F. machines. Major Becke tried the new R.E. machines.

Flying Depôt. S. Farnborough.—Experiments on various lines were continued, the machines used being B.E. and M. Farmans. The workshops and M.T. branch were busy throughout the week.

General News.—The Military Wing suffered a severe loss on Wednesday last by the deaths, as the result of an accident, of Captain C. R. W. Allen, Welsh Regiment, and Lieutenant J. E. G. Burroughs, Wiltshire Regiment. Captain Allen was piloting a B.E. with Lieutenant Burroughs as passenger when, shortly after leaving the ground, the rudder became detached, thus causing the machine to get out of control and dive to the ground. Both officers were killed instantaneously. Captain Allen had been in the Military Wing since its formation in May, 1912, Lieutenant Burroughs since April, 1913.

A Special Reserve for Mechanics.

IN reply to a question put by Mr. Joynson-Hicks, in the House of Commons, on the 11th, inst., Col. Seely stated that it was proposed to open Category (a) Special Reserve shortly for the enlistment of mechanics, &c., for the Flying Corps. Those enlisted will be called up for a certain amount of training every year.

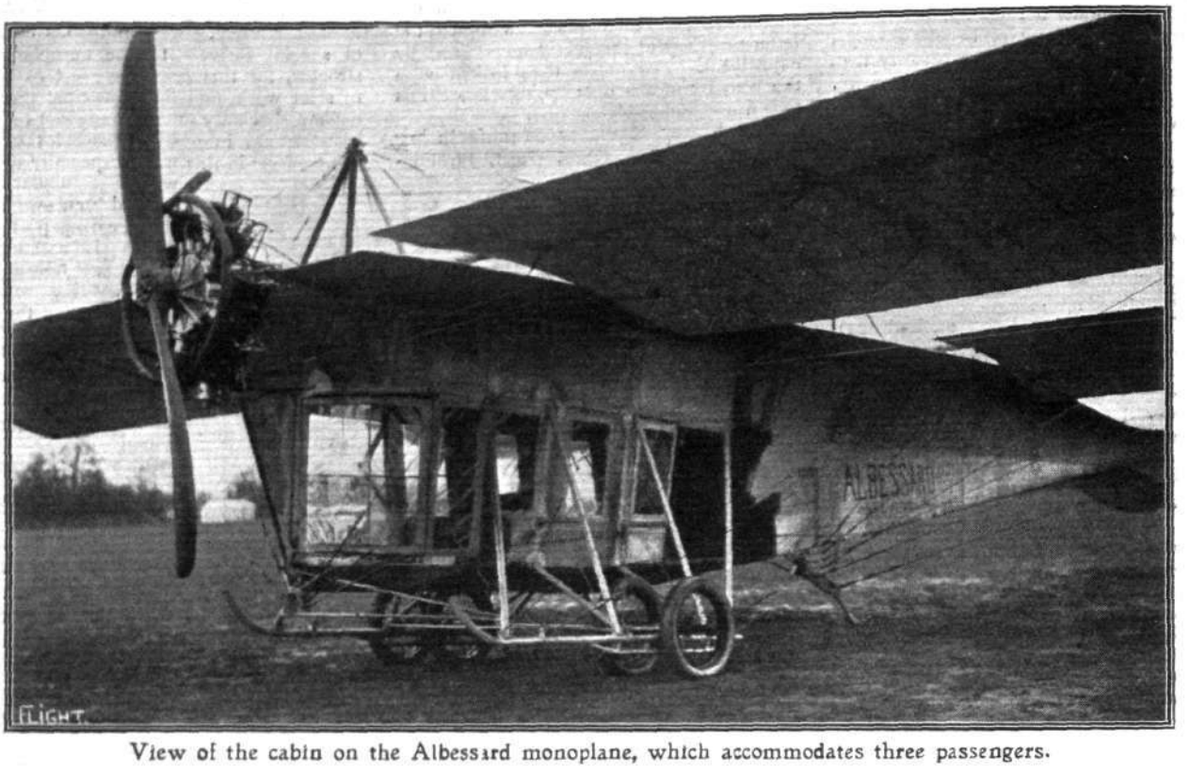
No. 6 Squadron, R.F.C.

COL. SEELY also stated that there were 14 serviceable aeroplanes in use by No. 6 Squadron of the Royal Flying Corps. They were accommodated in permanent hangars.

Military Wing, R.F.C.

ON Wednesday a question by Mr. Joynson-Hicks drew from Mr. Baker (Financial Secretary to the War Office) the information that there were 75 officers in the five effective squadrons of the Military Wing of the Royal Flying Corps. All of these are flying officers, none being engaged on administrative work alone.

FOREIGN AIRCRAFT NEWS.



View of the cabin on the Albessard monoplane, which accommodates three passengers.

Flying from France to Corsica.

THREE French Naval Officers, Lieuts. de l'Escaille, Destrem and Janvier, succeeded on Friday of last week in flying across the Mediterranean from St. Raphael to the island of Corsica. The two former, each on a Nieuport seaplane fitted with 100 h.p. Gnome motor and Integral propeller, set out from St. Raphael and after reaching Calvi flew round the Corsican coast to Ajaccio. Janvier, who was on a biplane, had to come down, owing to his petrol supply failing, just before reaching Calvi, and he was conveyed into harbour by the aeroplane mother-ship "Foudre." The time taken for the journey of 250 kiloms. to Ajaccio was 2 hrs. 45 mins.

Motors for French Military Aeroplanes.

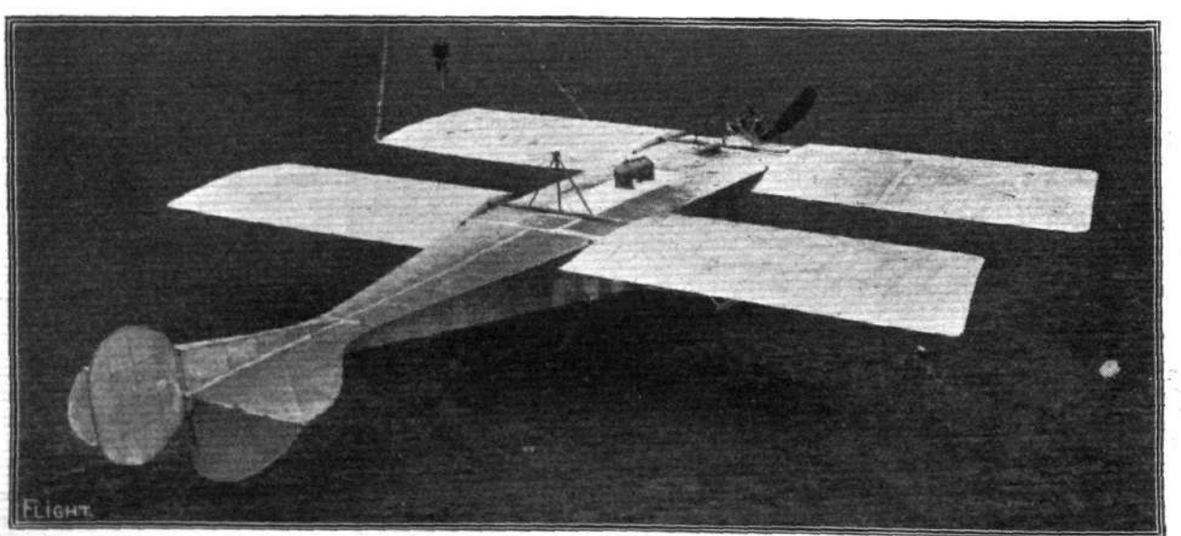
A CIRCULAR has recently been addressed by the French Minister of War to the various engine manufacturers, drawing their attention to the fact that for use on aeroplanes a motor of the fixed type is preferred, and makers are asked to concentrate their attention on engines of that type.

Paris to Entertain Municipal Visitors with Flying.

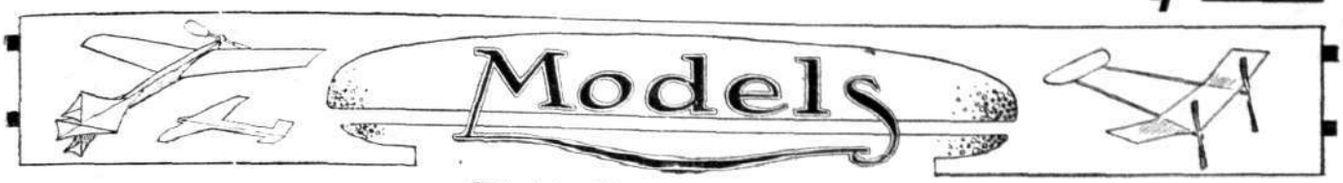
AMONG the fêtes, etc., with which the Paris Municipal Council proposes to entertain the visitors from the principal foreign cities, including a deputation from the London County Council, in June next is a flying meeting, which it is intended shall be held on the Longchamps racecourse if the necessary permission can be obtained.

Hanouille Drowned at San Sebastian.

THE fate of Le Blon at San Sebastian nearly four years ago was recalled by a somewhat similar accident which cost the life of Hanouille at the same place on Monday last. Hanouille had been giving an exhibition of looping the loop, and was making an upside-down flight when his machine fell from a great height into the bay. The pilot, as in the case of Le Blon, was trapped beneath the machine and was drowned before help could reach him.



View from above of the Albessard double monoplane, which is fitted with a pendulum automatic stability device. The span is 11 metres and the overall length 12 metres. It is fitted with a 100 h.p. Anzani motor, and weighs 750 kilogs. empty.



Edited by V. E. JOHNSON, M.A.

Aero Models at Olympia. Some General Remarks.

The official catalogue contains a list of 216 exhibits. Of these no less than 186 are club exhibits, divided amongst ten clubs, including the Kite and Model Aeroplane Association, which alone embraces some 64 exhibits. The number of private exhibits is therefore only 30, a fact deeply to be regretted. In fact the clubs swamp everything. All the 186 models are arranged under their respective clubs (save a certain number of hydro-aeroplanes in the tanks), and the eight different competitive classes are all mixed up together in a manner which we suppose is unavoidable, but which is extremely irritating to anyone desiring to gain class information. No information whatever is given in this respect in the official catalogue, and an ordinary visitor would go away, so far as we can see, absolutely unacquainted with this interesting side of the question.

The most interesting and encouraging feature in the exhibition is the large increase in the number of power-driven or engined models exhibited, and which will apparently compete in actual flight against one another at the flying tests. It is most earnestly to be hoped that this is really what will happen, and that their owners will not change their minds and withdraw them at the last moment. We also trust that the rising board and other arrangements will this time be quite adequate and satisfactory to all the competitors. We must confess to some considerable feeling of disappointment in class 3, the hydro-aeroplane class. The number of exhibits in this class (taking our figures from the official catalogue) is 34, quite a good number, although not so many as we should have expected. In this class 25 extra marks are to be awarded for models fitted with wheels as well as floats, *i.e.*, for models capable of proving themselves able to rise off land as well as water. Contrary to what one would have expected, the majority do not appear to have fitted wheels as well as floats, and of those who have, only a few appear to have fitted the wheels so that they can be raised or lowered at will. Amongst the latter we notice Messrs. A. F. Houlberg, J. McBirnie and L. H. Slatter, all who have devised a very neat way of doing this to which further reference will be made later. Generally speaking this class contains no particular innovation. No complete power driven hydro-aeroplane is exhibited, but a beautifully-made machine by Messrs. D. Hiscox and C. Desoutter is shown, fitted with the necessary struts and float supports but without the floats. As a matter of fact, this machine is for a later competition, since no engined model is eligible in this class.

Class 8, ornithopter models, is represented in the official catalogue by nine models only, not a large number when one considers that a prize of ten pounds is offered for a flight, the minimum qualifying duration of which is only 15 secs. Some very interesting models are exhibited, including one by Mr. C. Desoutter and another by Mr. G. P. Bragg-Smith. An especially interesting one is that exhibited by Mr. G. Hayden, of the Wimbledon Model Club, of the type illustrated, and described in FLIGHT, November 29th, 1913, p. 1,311. We were informed by a spectator who has seen this model in flight that its motion was quite even and steady; and the model looks to have about it a longitudinal balance, which of course the other ornithopter models may possess, even in a greater degree, but in which they *look* somewhat lacking.

In class number six, the weight-carrying contest, some good substantial models are exhibited showing various neat points of design and construction, to which special reference will be made later on.

Class seven, models embodying new design applicable to full-sized machines, does not appear to be very largely represented, a fact which one can scarcely be surprised at, when the value of the prize offered (at the discretion of the judges), viz., £3 only, is borne in mind. There is, however, of course, the indirect value that the securing of such a prize might have to be added to this.

There are, however, several interesting exhibits apparently belonging to this class which we propose to deal with later. With regard to class one, the power-driven or engined model, as already stated, this class is, in our opinion, *the* class in this section of the exhibition. Mr. Stanger exhibits two large monoplane models, both fitted with petrol motors; one a tractor and the smaller a Canard-type machine, both of very promising design, and which certainly look as if they ought to give a good account of themselves. Mr. H. H. Groves shows two of his well-known flash boiler pump-fed type machines, both monoplanes this time. A very large machine is exhibited by Mr. C. Fearn, fitted with a Bonn-Mayer petrol motor, which has, we believe, made many flights. The model is somewhat lacking in finish, but it looks a strong, sturdy-looking machine, constructed to stand a lot of rough usage. The motor and propeller are both behind the main plane, and so are well protected. Messrs. T. W. K. Clarke and Co. exhibit a very neat-looking model, driven by a compressed-air motor, and fitted with twin cylindrical reservoirs.

Mr. D. A. Pavely, of the Croydon Aero Club, exhibits a power-driven model (minus planes), fitted with a pressure-fed, flash-boiler steam plant and rotary motor. A power-driven model monoplane is also exhibited by Mr. J. Jack, of Leytonstone and District Club.

Mr. R. V. Tivy, of the Bristol Aero Club, shows a power-driven model monoplane containing a steam plant of an unusual type, and several other exhibitors have engined models on show; so that this class is quite well represented. Mr. W. H. Akehurst, the well-known Secretary of the K. and M.A.A., makes, we believe, his *début* as a model aeroplane exhibitor at this Exhibition with a very neat monoplane driven by a very ingenious system, with regard to which we had an argument with one of the best-known aeromodellists as to whether it constitutes an engine or not, *i.e.*, is the model what is known as power-driven or not? We will unravel this mystery at a later date.

Speaking generally, the technique and workmanship are extremely good, and any aeromodellist or anyone interested in models will find much to interest him. To make only a very casual examination of some 200 models takes a very considerable time, and many little points must escape detection and notice. We shall be glad, therefore, to receive from exhibitors a brief description, accompanied when possible by a sketch.

(*To be continued.*)

Model Firms at Olympia.

Only two model firms are represented at Olympia: The Birmac Model Aeroplane Co., of 124, West Green Road, Tottenham, London, N., and Messrs. T. W. K. Clarke and Co., of Hampton Wick Works, High Street, Hampton Wick, Middlesex. Whenever we happened to be in the vicinity of either an extremely brisk business was being carried on.

The Birmac Model Co. have on show a large stock of models ranging in value from 1s. 6d to £5, including R.O.G. machines capable of making very long and high flights, as well as hydzo-aeroplanes and a very large assortment of model accessories. One of the specialities of this firm is their hand-carved and laminated propellers from quite a small size up to 6 ft. and more in diameter.

Messrs. T. W. K. Clarke and Co. have on view an excellent selection of model aeroplanes, parts and accessories, model petrol motors, and a large assortment of rotary compressed air motors, and waterplane floats; also welded fittings, of which this firm make a speciality.

Aero Club for South London.

Mr. Vivian Drake, writing from 86, Stockwell Park Road, Brixton, S.W., asks us to publish the following: "I am desirous of forming an aero club in South London for flying models, and subsequently a glider. We have a room very kindly placed at our disposal, fitted with benches, in which we could work and hold meetings. There are several flying grounds in proximity to the proposed headquarters, and I should be very pleased if anyone interested in aviation generally, as well as model flyers, would write to me, as it would be as well if the club was somewhat of a 'students' club.' I sincerely trust that no one will be deterred from joining on account of ignorance or inexperience, as one can usually learn more in six months in a club than in a year by oneself. I have seven promises of membership already. Before closing, I wish to state our keen appreciation of your model section, especially the scale drawings."

Anemometer for Model Clubs.

Mr. J. B. Fitzsimons (Hon. Sec. Ilford Model Aero Club) writes:—"Could you or any reader of FLIGHT give me the name of any firm who manufacture a very cheap anemometer? Failing this, could you tell me how to 'rig up' a cheap one?

"Several members of this club have not turned up to some of the flying meetings because the wind (according to them) was too boisterous, so it was suggested to me to obtain an anemometer to enable the club to gauge the exact velocity of the wind at flying meetings. Does any other secretary do anything in this direction? If so I should be pleased to hear from him."

We do not know of any firm that supply a really *cheap* anemometer that is any good, although of course there may be such. It is not the actual making of the anemometer so much as the correct

calibrating it, and the deducing of the chart of relative corrections which every anemometer should possess, which is the trouble. It is not an instrument that can be "rigged up" out of a few odds and ends, or, to speak more correctly, it could be so rigged up, but how are you going to calibrate? Something could be done in this way, if you could borrow a good one and do it by means of that. Something in the pressure plate line would be much simpler and easier to construct, like the one used by Sir Hiram Maxim. *See* Thurston's "Elementary Aeronautics," pp. 76–77.

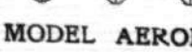
Messrs. W. E. Evans and Sons' Latest Productions.

We have received from the above well-known firm some excellent samples of their latest specialities for aeronautical model workers. We take this opportunity of pointing out that lightness or reduction in weight, so long as strength is not sacrificed, is in reality an immense benefit in the other arts and sciences as well. To take a concrete case, the writer happens to be building at the present time a novel electrical machine; as it is to be portable, lightness is an important item. By employing principles and practice learnt chiefly from aeronautical models and specialities and accessories which have been introduced to the public since model flying came into vogue, I find I can reduce the weight of the machine to *one-third* what such a machine would weigh in the ordinary case and still obtain *twice the efficiency*. Moreover, this is not the first time I have applied such practice. Even if model aeronautics were worthless in itself, it would still be worth studying for the use which such is in other practical work. Amongst the samples kindly sent us by Messrs. W. E. Evans and Sons are some veneer tubes of specially selected sycamore, double thickness, viz., one 4 ft. long by 1 in. in diameter, and other 3 ft. 6 ins. long by $\frac{3}{4}$ in. in diameter. In spite of their lightness and extreme thinness they are immensely strong, and especially so far as any end thrust is concerned, the rubber model could well be contained *in* the tube, a method we have more than once advocated, since it does so much to diminish head resistance. Some excellent samples of hollow streamlined spars are also enclosed. There is no doubt that these are coming more and more into vogue, chiefly owing to the fact that with such no kingposts and wire bracing are required, which is, generally speaking, an advantage. These spars are made of the finest silver spruce, specially selected, and are 3 ft., 3 ft. 6 in., and 4 ft. in length. The maximum depth and width vary, of course, with the length of the spar.

Another new line is an improved "*plane*" edging, or, strictly speaking, "*leading edge*," made of white birch, a very tough and clean sample of which we have tested, and which shows no tendency to break off short. We also find that if only reasonable care be used, fine nails can be driven through it without splitting. The rounded plane edge placed on the market some months ago by the same firm has, we are informed, been in great demand. The quality of this white birch certainly leaves nothing to be desired.

The remaining enclosures sent us included a pair of 9 in. cambered propeller blanks for bending (these are remarkably thin and strong), and 2 pairs of 9 in. shaped propeller blocks for carving. These latter the firm supply in three different woods, viz., satin walnut, whitewood (poplar) and pine. Also a large selection of 3-ply wooden wheels, $1\frac{1}{8}$ in., $1\frac{1}{2}$ in., 2 in., $2\frac{1}{2}$ in. and 3 in. in diameter. These wheels are cut out, and are very light and strong, and have quite a neat appearance. Painted with aluminium paint, one could quite well take them for wheels made of that metal, but they are, of course, much stronger than such would be.

As regards the weight of the hollow spars and tubes, the firm find it expedient not to cut the weight down too fine, but to leave this part of the business to the skilful model maker, who can easily reduce the weight by means of sandpapering to the desired limit. Messrs. Evans, however, are quite prepared to turn out specially light spars for record-breaking models. For instance, some time ago they supplied to a leading firm a hollow spar 3 ft. long, section $\frac{3}{4}$ in. by $\frac{1}{4}$ in., the weight of which, including the polish, was barely $\frac{1}{2}$ oz. A similar spar, 4 ft. long and section 1 in. by $\frac{1}{2}$ in., weighed $\frac{1}{16}$ oz., or 15 drams; another spar, 3 ft. 9 in. long, came out at 13 drams. Messrs. W. E. Evans and Sons supply their wood and specialities direct to the trade only, but they are obtainable from the principal supply houses for models and their accessories.



KITE AND MODEL AEROPLANE ASSOCIATION

Official Notices.

Aero Exhibition.—A fairly good exhibit of models has been received, but there are only a few novel ideas. There are 15 entries on the power-driven class, and it should prove an interesting competition. The exact date of the flying trials will be announced next week, and all those who do not intend competing will oblige by informing the hon. sec. Passes, &c., will be distributed at the Exhibition.

Membership.—Will all members endeavour to enrol at least one new member during the exhibition.

27, Victory Road, Wimbledon. W. H. AKEHURST, Hon. Sec.

AFFILIATED MODEL CLUBS DIARY.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (27A, SEDGEMERE AVENUE, EAST FINCHLEY, N.)
MARCH 21ST, flying Finchley, 3 p.m.; March 22nd, 10 a.m. April 5th, annual general meeting.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).
MARCH 22nd, flying on Wanstead Flats 10 a.m. If wet meet at club room.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).
MARCH 21ST, members meet at club stand, Olympia, 6 p.m.

Reigate, Redhill and District (THE COTTAGE, WOODLANDS AVENUE, REDHILL).
MARCH 21ST, club visit to Olympia; train leaves Redhill at 8.50 a.m.

Sheffield Ae.C. (41, CONISTON ROAD, ABBEYDALE, SHEFFIELD).
MARCH 28TH, at 3.30 p.m. at Standhouse Aerodrome, Intake, first contest for weight-carrying machines, also hand-launched. Novices, for silver medal and bronze medal, presented by Mr. C. F. W. Cudworth. April 11th, tractor biplane contest for Mr. M. D. Manton's silver medal.

UNAFFILIATED CLUBS.

Finsbury Park and District (52, LAMBTON RD., STROUD GREEN).
MARCH 21ST, flying as usual, Finsbury Park Kite Ground, 2.30 p.m. till dusk.

Ilford Model Ae.C. (83, ENDSLEIGH GARDENS, ILFORD).
MARCH 22ND, flying, 9.30 a.m. (weather permitting), Hog Hill, Hainault Forest, Chigwell Row.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).
USUAL week-end flying at Woolwich, Blackheath and Lee. On Saturday (21st inst.) the hon. secretary, Mr. A. B. Clark, will be pleased to meet friends visiting Olympia, at FLIGHT stand between 6.30 and 7.30 p.m., and on Monday same time and place.

AERONAUTICAL SOCIETY OF GREAT BRITAIN.

Official Notices.

1. **Elections.**—Members: Eng. Lieut. G. Aldwell, R.N., and F. S. Barnwell.

2. **Meeting.**—The tenth meeting of the present session will be held on Wednesday, April 1st, at 8.30 p.m. Messrs. B. C. Hucks and C. Gordon Bell will read a paper on "Three Years' Flying Experience," followed by a discussion.

Members are reminded that, under the rules, they may introduce visitors to general meetings.

Tickets for visitors, not introduced, may be obtained from the Secretary, 11, Adam Street, Adelphi, W.C.

B. G. COOPER, Secretary.

CORRESPONDENCE.

Aerodynamic Effects of Gusts on Wings.

[1846] Your correspondent, Mr. S. C. Shepley Part (1845), suggests that the number of pulsations of the propeller draught per minute is equal to one-half the number of revolutions of the propeller. I suggest that they are obviously equal to twice the number of revolutions.

Eccles, March 15th. R. A. TURNER.

"Controls."

[1847] I notice in FLIGHT of March 7th, you give an illustration and descriptive matter of the new Wright control. May I point out that this control is, in principle, identical with that which I had on my machine at Brooklands in 1910 (and which was invented about two years previous to that).

Walton-on-Thames, March 9th. G. H. POINTER.

FLIGHT.

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